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COMPUTERWORLD

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NEWSPAPER

Paris fete for redundant VAX

Cirrus One fault-tolerant VAX called potent entry into OLTP market

BY MARYFRAN JOHNSON
CW STAFF

Parlez-vous fault tolerance?

Digital Equipment Corp. will answer that question with a loud *"oui!"* Feb. 27 in Paris when the minicomputer company introduces its first fault-tolerant VAX, *Computerworld* has learned.

Also expected to debut at the Paris bash are the newest version of DEC's operating system, VMS 5.4, and an updated version of its transaction processing software.

Estimated to cost from $230,000 to $240,000 at the entry level, the Cirrus One never-fail computer is based on two Microvax 3800 midrange systems with duplicate CPUs, mass-storage devices, power supplies and other redundant components.

One vital feature of the Cirrus machine will be its bus structure — the DSSI, or Digital Small Storage Interconnect — first introduced two years ago with the Microvax 3300.

The DSSI was designed specifically for small, general-purpose systems applications and is used as a storage interconnection between the CPU and the disk.

DSSI "gives two systems the capability of concurrent access to the disks, so data can be [retrieved from] there and doesn't have to be sent over the Ethernet," said a Midwestern user who had been briefed on the Cirrus One. "For data-intensive applications, a major performance bottleneck for Vaxclusters is that Ethernet pipe."

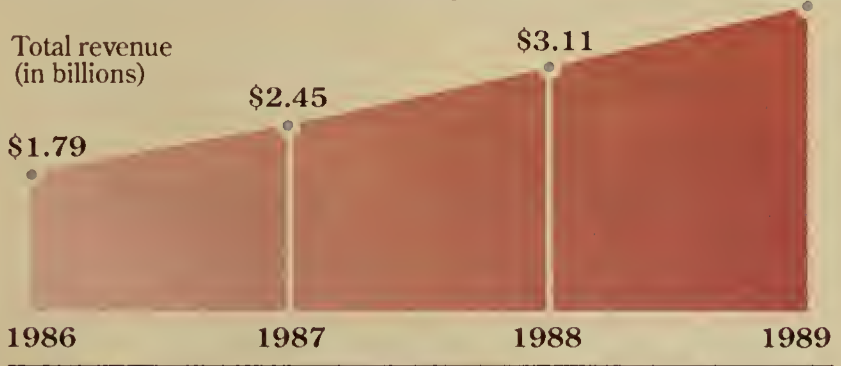
"Simplistically, Cirrus One is two Microvax 3800s bolted together," said Terry Shannon, an analyst at International Data Corp. in Framingham, Mass. "There is some special [circuitry] strung through to ensure the applications run in lockstep on both processors."

Each processor in the Cirrus will feature 32M bytes of

Continued on page 144

Market allure

Fault-tolerant systems sales show steady growth



SOURCE: FROST & SULLIVAN, INC. CW CHART: JOHN YORK

Among Big 3, Chrysler first in EDI links

BY ALAN J. RYAN
CW STAFF

DETROIT — Chrysler Corp. has outpaced its Motor City competition, but its latest honor has nothing to do with sales revenue or minivans. Chrysler has assumed a leadership role in the field of electronic data interchange, benefiting both its trading partners and itself.

EDI found early acceptance in the 1970s by the Big Three U.S. auto makers — Chrysler, General Motors Corp. and Ford Motor Co. Chrysler has spent the last two years revamping its old system while helping to establish ANSI X.12 standards for EDI through its affiliation with the Automotive Industry Action Group, or AIAG.

Even in its earliest days, EDI proved its worth, saving Chrysler $1 billion in inventory during

Continued on page 143

Early 3090 J users beaming as IBM delivers on promises

BY ROSEMARY HAMILTON
CW STAFF

The IBM 3090 J series is making a fine first impression.

Based on interviews with four early users of IBM's most powerful mainframe, the system is living up to IBM's performance claims and has actually surpassed the firm's estimates for installation time.

"It's performed flawlessly," said Ron Payne, manager of technical support at Blue Cross/ Blue Shield of Tennessee. "Insofar as the horsepower of the 600J goes, it appears to be as advertised."

IBM has plenty riding on the initial performance of its J series. Its predecessor, the S series, acquired a bad image after a string of glitches last year, including chip problems, shipment delays and thermal conduction module failures. IBM did not officially cancel the S series, but for all intents and purposes, the J is its replacement. Customers can get an S model if they insist, but

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Inside

BUYERS' SCORECARD

Computerworld introduces user ratings of key products in a new monthly section, Buyers' Scorecard. This week, users rate SNA and multivendor integrated network management systems. Page 96.

U.S. recalls virus-laden census disks

BY MICHAEL ALEXANDER
CW STAFF

WASHINGTON, D.C. — The Government Printing Office narrowly averted triggering a nationwide computer virus epidemic late last month after picking up an infection from the U.S. Census Bureau.

On Jan. 25, the GPO was in the process of mailing packages containing two floppy disks and a compact disc/read-only memory disc holding census data to 772 depository libraries scattered across the country when it learned from the Census Bureau that one of the two disks had been infected by the Jerusalem virus, said Jan Erickson, manager of information technologies at the GPO. The floppy disks contained programs that enabled users to retrieve data from a CD-ROM disc published by the Census Bureau containing the County and City Data Book.

The Jerusalem virus, also known as the Israeli, Hebrew University and Friday the 13th virus, attacks both .COM and .EXE files on personal computers running under MS-DOS, according to John McAfee, president of the Computer Virus Industry Association in Santa Clara, Calif.

The virus repeatedly infects executable files, increasing them by about 1.8K bytes, until the computer's memory is clogged, McAfee said. In addition to slowing an infected system, some versions can destroy data, although that does not appear to have happened in this instance.

"The GPO's [distribution] system allows libraries to choose

Continued on page 6

Disk fraud

FBI arrests anthropologist accused in AIDS information disk scheme. Page 8.

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145 Department of Commerce loosens a few of the ties that bind supercomputers to their native shore.

Quotable

"The bloom is off that rose. Everyone looked at strategic systems as the Holy Grail, something to search for."

GARY K. GULDEN
INDEX GROUP

On the waning interest in strategic systems. See story page 6.

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UPDATE

Paraphrasing Robert Reich on the globalization of business, from the latest *Harvard Business Review:* "Most U.S.-owned firms are quite happy to receive special advantages from the U.S. government and then spread the benefits to their affiliates worldwide. As Sematech [the federally backed chip consortium] heats up, its members are busily going global. Texas Instruments is building a $250 million plant in Taiwan. Motorola has paired with Toshiba to produce futurist chips. AT&T will build a plant in Spain. So who will make chips in the U.S.? Japanese-owned NEC will build a $400 million facility in California."

U.S. and foreign software pirates are feeling the legal heat. Page 107.

MARTHA EVERSON

Consultant Peter Sevcik breaks all the rules when he advises against network integration. Page 99.

EXECUTIVE BRIEFING

■ **IS executives are paying more attention** to re-engineering the business than ever before, according to Index Group's annual survey of senior information systems executives. "Reshaping business processes through information technology" jumped to the top of the list of concerns from 11th place last year. In contrast, "Using IS for competitive breakthroughs" went from first last year to eighth in the latest survey. **Page 6.**

■ **DEC will enter the fault-tolerant computing market** later this month, sources say. DEC's first stab at hardware-based fault tolerance uses redundant CPUs and other components. Sources who have tested the machine say it will be a formidable competitor to Tandem and Stratus. **Page 1.**

■ **IBM is expected to unveil** low-end AS/400 and 9370 systems this week. The plan seems to be to lower the entry barriers of the AS/400 line and add distributed functions to the 9370. **Page 143.** Sources are praising the price/performance of a series of IBM RISC systems expected to be announced next week. The RISC System/6000 is expected to top out at 41 MIPS. **Page 143.**

■ **The shape of corporatewide networks is flattening** as managers break down the hierarchy to move data closer to the users. The problem is, the technology is just emerging to manage, connect and integrate these hybrid, multivendor systems. New types of design tools are one aid; a library of LAN interconnectors is another. **Page 89.**

■ **Firms with large field sales forces** may latch on to the wireless communications network to be developed by a joint venture between IBM and Motorola. The idea is to let "mobile professionals" communicate to a host computer over radio waves without tying up phone lines. **Page 4.**

■ **The use of computerized job screening has its ups and downs.** A Georgia Institute of Technology study finds that job seekers are more likely to tell the truth in a computerized interview. However, the study also points out that management-level applicants expect an in-person meeting, and they may resent an automated interview. **Page 81.**

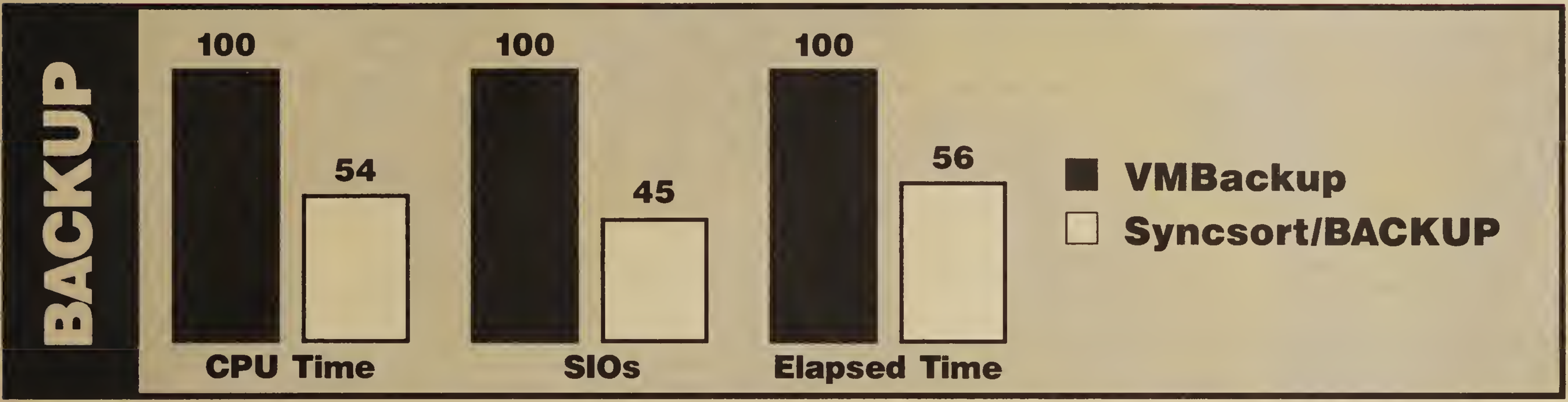
■ **Automatic telephone number identification** may give you a competitive advantage, but public backlash against random disclosure of those numbers could stymie its use. Some critics predict that court challenges and legislative action will result if the technology is allowed to take hold. **Page 67.**

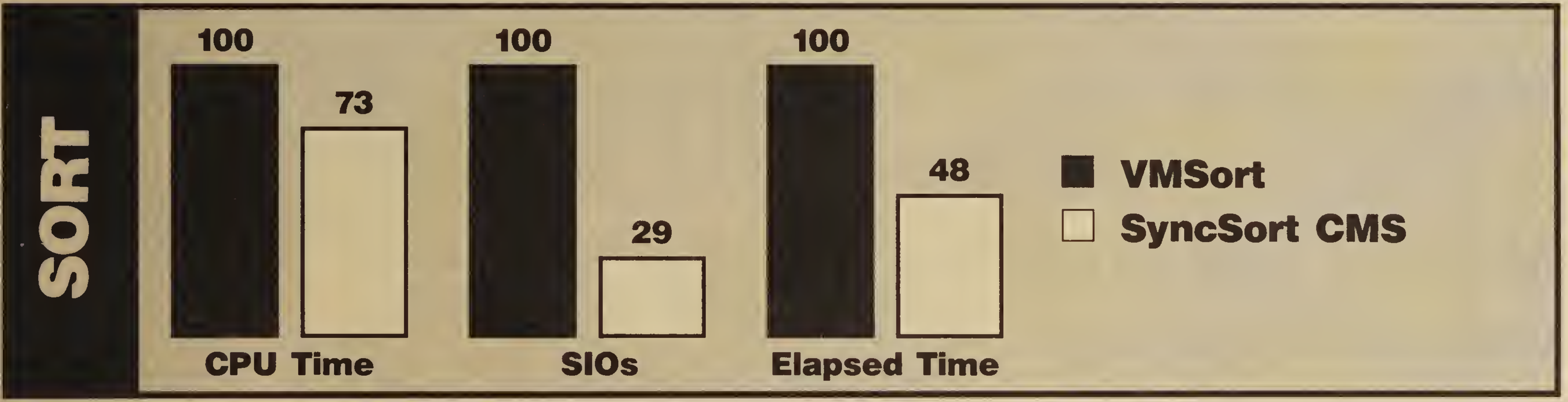
■ **Two U.S. government agencies nearly released** a computer virus in January when infected disks containing U.S. Census Bureau data were discovered during a mailing. Some of the disks got out, but no troubles have yet been reported. **Page 1.**

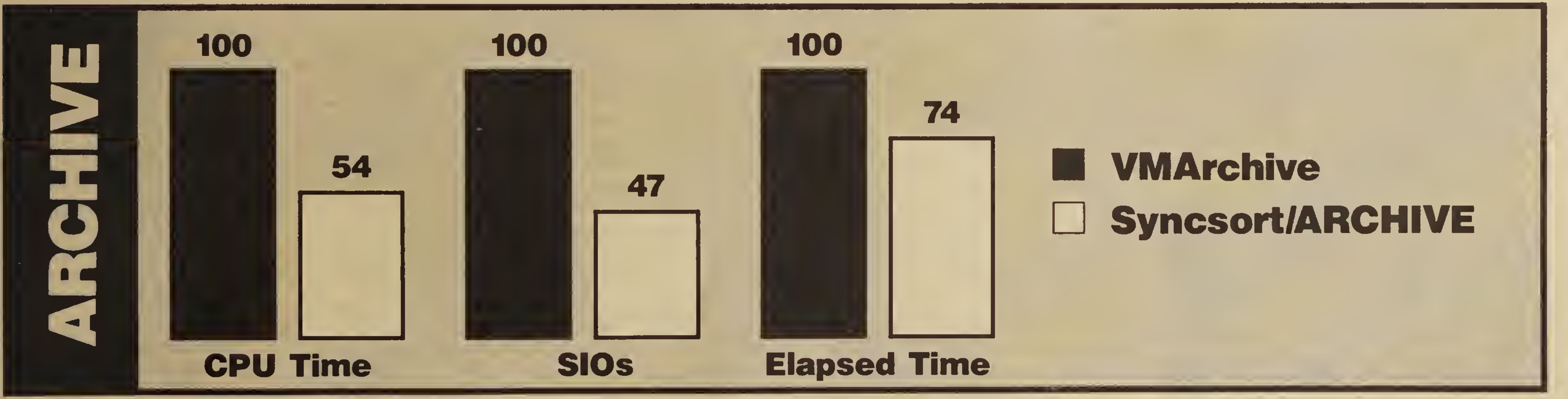
■ **Look-and-feel goes to court** this week as Lotus' 3-year-old suit against Paperback Software and Mosaic Software finally gets a hearing. The case is being closely watched as a bellwether for several other major pieces of pending copyright litigation. **Page 144.**

■ **On-site this week:** It was feast or famine for a specialty foods firm whose seasonal business threatened to leave it with excess mainframe capacity during the slow times. The solution: handling the seasonal rush with PC LANs. **Page 29.** Price Waterhouse springs for 10,000 copies of Lotus Notes as a rationale for getting into networking early. The firm is also using Compaq's new Systempro file servers, one dedicated exclusively to Notes. **Page 63.** K Mart looks to 486 systems, wireless handheld terminals and links to a mainframe to tie its inventory operations together. **Page 59.** A lot more people than just executives use executive information systems at Analog Devices. The company has put its EIS summary data powers to use at all levels within the firm. **Page 30.**

VM PERFORMANCE FROM SYNCSORT







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Bush plan kind, gentle to high-tech

R&D, Sematech, HDTV retained, but other initiatives seen underfunded

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — For the computer community, the Bush administration's fiscal 1991 budget proposal was both sweet and sour. President Bush called last week for a permanent research and development tax credit and extra money for computer standards work, but funding for the high-performance computing initiative was a disappointment.

In keeping with his penchant for incremental change and opposition to "industrial policy," President Bush offered no dramatic initiatives to boost U.S. competitiveness. However, he did retain funding for Sematech, the chip consortium, and grants for high-definition television research, two programs that congressional supporters feared would be axed.

The National Institute of Standards and Technology (NIST), usually targeted for major budget cuts during the Reagan era, got a boost from the administration. The NIST computer and telecommunications laboratories were budgeted at $13 million, a 39% increase from the current fiscal year.

The prime beneficiaries would be the NIST programs supporting computer security and Integrated Services Digital Network (ISDN) standards. The computer security program would increase from $2.5 million to $5 million, while the ISDN program would jump from $300,000 to $1.3 million.

Uncle Sam's wallet

High-tech government initiatives come through relatively unscathed in the Bush administration's budget proposal

- High-priority information systems: **$2B, up 25%**
- Research and development tax credit: **Permanent extension, costing $500M in 1991**
- High-performance computing research: **$469M, up 5%**
- Robotics research and development: **$192M, up 28%**
- Sematech: **$100M, no change**
- NIST* computer programs: **$13M, up 39%**

*National Institute of Standards and Technology

SOURCE: U.S. OFFICE OF MANAGEMENT AND BUDGET

CW CHART TOM MONAHAN

The computer industry, weary of fighting for one-year extensions of the 20% R&D tax credit, was pleased with Bush's support for making it a permanent part of the tax code. Uncertainty over those extensions may have caused companies to hold back on risky research projects, according to the Computer and Business Equipment Manufacturers Association (CBEMA).

"The proposed permanent credit acknowledges that R&D efforts generally are multiyear projects linked to considerable risks for an individual company," CBEMA President John L. Pickitt said in a prepared statement.

According to the budget document, the High Performance Computing Program would increase 5% to $469 million. However, that falls short of the $651 million figure envisioned by the president's Office of Science and Technology Policy when the initiative was announced last year [CW, Sept. 18, 1989].

"We were hoping for more," said Bill Bartolone, director of legislative and federal programs at Cray Research, Inc. and chairman of the High Performance Computing Coalition. However, Sen. Albert Gore Jr. (D-Tenn.) and Rep. Doug Walgren (D-Pa.) are expected to push for full funding this year.

The initiative calls for research on high-performance supercomputers and a high-speed national research network.

The Bush budget also stressed the importance of improving the management of federal operations through the use of information technology. The budget document also gave priority to upgrading computer systems at the Internal Revenue Service and modernizing equipment used for air-traffic control.

The budget requested nearly $2 billion for these and other high-priority federal information systems, $402 million more than in fiscal 1990, the Office of Management and Budget reported.

Motorola, IBM go live with mobile data net

BY ELLIS BOOKER
CW STAFF

SCHAUMBURG, Ill. — Motorola, Inc. and IBM went on the air last week, combining their private radio networks and forming a joint venture that will provide a nationwide commercial data communications system.

Ardis' Blumenstein

The new venture, dubbed Ardis, is designed to give the estimated 10 million "mobile professionals" in the U.S. a way to network on the run.

Scheduled to go on-line in early April, the Ardis network will combine IBM's national private radio system, which Motorola designed and installed in 1983, and Motorola's own shared-use radio data network.

The first customer to test the new service will be New York Life Insurance Co. in New York, which said its agents will now have access to corporate databases and will be able to perform data entry from the field, all without tying up its own clients' phone lines.

James S. Ellis, vice-president of telecommunications at New York Life, is excited about the prospect of "untethering" the company's 11,000 insurance agents, more than 50% of whom already use a personal computer or a laptop, he said.

"In an untethered environment," Ellis said, "applications for a laptop computer could be designed to access a mainframe automatically."

Likewise, Sears, Roebuck and Co. in Chicago said it plans to test the radio network as a means for its field force of 19,000 technicians and 14,000 vehicles to access the company's existing private network, operated by Sears Technology Services, Inc. Ardis executives said other firms will test the network in the coming months.

Until now, IBM's network has been used exclusively by its 16,000 IBM and 2,000 Rolm service personnel, who use a handheld terminal from Motorola to communicate from job sites or dispatch centers. Motorola's network is available to commercial customers — among them, Avis, Inc., in Chicago, New York and Los Angeles.

The network will contain more than 1,100 radio base stations and provide service to more than 8,000 cities and towns in 50 states, according to IBM and Motorola, which did not disclose financial details.

Although its base technology is not new, Ardis will bring the untethered networking to a much wider audience.

"Here is a humongous, relatively protocol-independent nationwide network," said Carl Pitasi, vice-president and director of enterprise network strategies at Gartner Group, Inc. in Stamford, Conn. "This is going to be great stuff for smaller companies that want to emulate an Avis or an IBM field service operation."

Pitasi noted that the IBM/Motorola network comes in advance of digital cellular networks, which will do a better job of carrying data than current systems but have yet to be deployed. "I look forward to this as a hybrid using digital cellular and possibly mobile satellite technology in the future," he said.

While radio is a popular medium for voice, the amount of data communications traffic "is very low today, almost unmeasurable if you're talking about two-way interactive data," said Jack W. Blumenstein, president and chief executive officer of Ardis.

The network will operate at 4.8K bit/sec. However, Ardis executives noted Motorola has built commercial networks that run at 19.2K bit/sec. using the same radio frequency technology, and plans are to upgrade its service to the higher speed as the network is expanded.

While pricing details for the service have yet to be worked out, Blumenstein said there will be a per-packet charge, with volume discounts and off-peak rates. "We're talking about 10 cents per [message] unit," he said, adding that the monthly price for a single user will be in the range of $100 to $150.

CORRECTIONS

Command Technology Corp., in Alameda, Calif., was incorrectly listed as Command Technologies Corp. in the Product Spotlight section of *Computerworld's* Dec. 11, 1989 issue.

A Jan. 15 *Computerworld* story about federal systems integrators incorrectly described a provision of the Walsh-Healey Act. The threshold for contracts covered by the law is $10,000.

Nevada Computer Technologies' software product, The Performer, was incorrectly described in the *Computerworld* New Products section on Jan. 15, 1990. The announcement should have read "the program improves batch run times in an IBM Application System/400 environment" instead of "the program increases batch run times . . ." as was previously reported. The firm is based in Reno, Nev.

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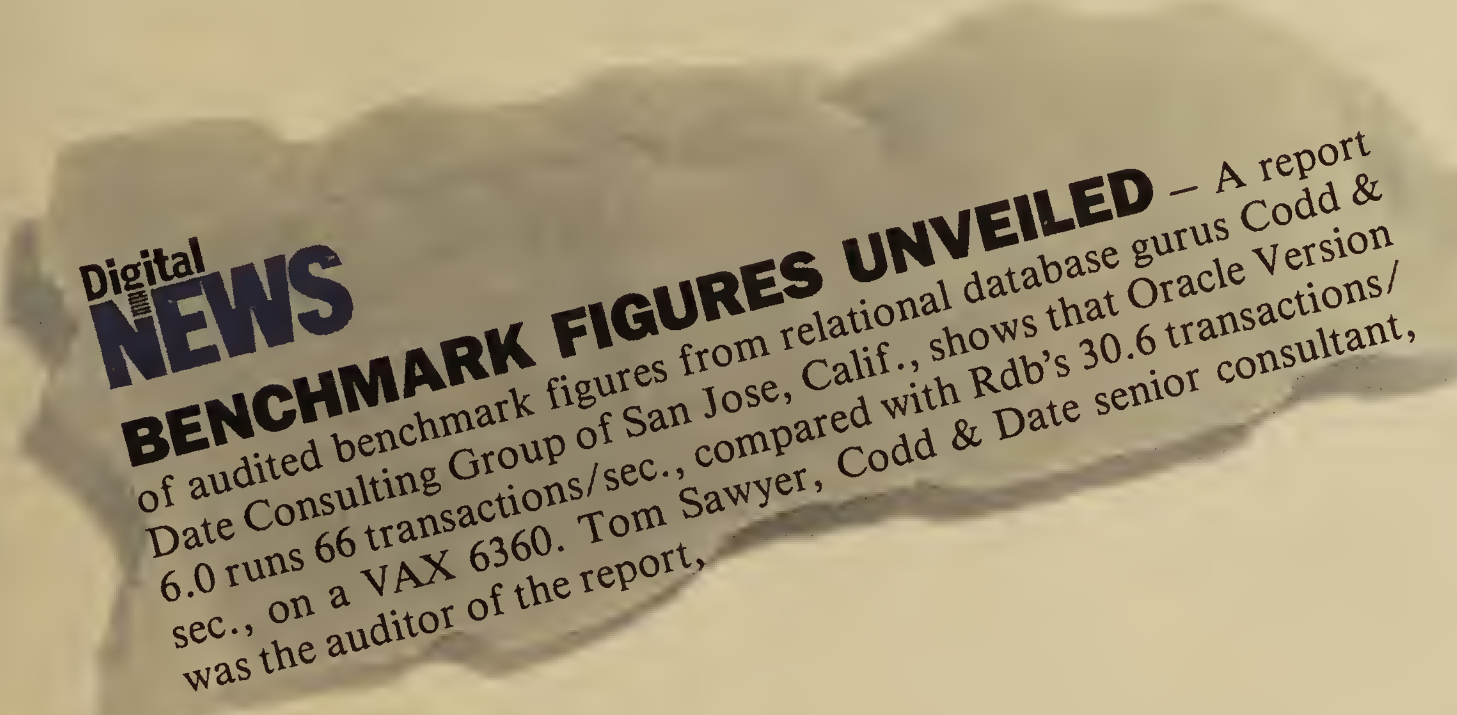

Digital NEWS

BENCHMARK FIGURES UNVEILED – A report of audited benchmark figures from relational database gurus Codd & Date Consulting Group of San Jose, Calif., shows that Oracle Version 6.0 runs 66 transactions/sec., compared with Rdb's 30.6 transactions/sec., on a VAX 6360. Tom Sawyer, Codd & Date senior consultant, was the auditor of the report,

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	Scottsdale	Feb 8*f*
	Sierra Vista	Feb 13*
CA	Bakersfield	Mar 15*f*
	Costa Mesa	Feb 15*p* Mar 27*f*
	La Jolla	Feb 20*f*
	Los Angeles	Feb 15*f** Feb 22*cfl* Mar 29*fpu*
	Sacramento	Mar 7*f*
	San Diego	Mar 20
	San Francisco	Feb 15*cf* Mar 22*lp*
	Santa Clara	Feb 13*lp* Mar 28*c*
	Woodland Hills	Feb 13*f*
CO	Colorado Springs	Feb 21
	Denver	Mar 12*f*
CT	Farmington	Feb 8*f*
	New Haven	Mar 6*f*
	Stamford	Mar 15*f*
DC	Washington	Feb 6* Mar 13*u**
FL	Fort Lauderdale	Feb 20*f*
	Fort Myers	Feb 16*f*
	Jacksonville	Mar 21*f*
	Melborne	Mar 14*c*
	West Palm Beach	Mar 28*f*
GA	Atlanta	Feb 7*f* Mar 8*c*
	Columbus	Feb 6*c*
HI	Honolulu	Mar 15*fp*
IA	Boise	Feb 6
	Des Moines	Mar 20*p*
IL	Chicago	Feb 6*f*# Feb 13*u* Mar 7*f*# Mar 14*l*
IN	Fort Wayne	Feb 22*f*
	Indianapolis	Mar 8*f*
KS	Wichita	Feb 7
LA	New Orleans	Feb 9*f* Mar 23*c*
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	Burlington	Mar 8*f*
MD	Baltimore	Feb 8 Mar 29*f*#
	Bethesda	Feb 7*f*#
MI	Dearborn	Feb 13*f*
MN	Minneapolis	Feb 6*cf* Mar 6*fp*
MO	Kansas City	Mar 21*c*
	St. Louis	Feb 7*cp* Mar 13*f*
NC	Charlotte	Feb 6*f*#
	Greensboro	Mar 8*f*#
	Raleigh	Feb 1*f*#
	Res Tri Park	Mar 15
NE	Omaha	Mar 13*f*
NH	Bedford	Mar 13*f*
NJ	Cherry Hill	Feb 21*c*
	Iselin	Feb 13*c* Mar 6*f* Mar 27*p*
NY	Binghamton	Mar 27
	Buffalo	Mar 15*c*
	Melville	Feb 14*p* Mar 21*f*
	New York	Feb 7*f* Feb 21 Mar 7*f* Mar 28*c*
	Rochester	Feb 6*p* Mar 22*f*
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PA	Allentown	Feb 7*f*
	Harrisburg	Mar 22*f*
	King of Prussia	Mar 7*l*
	Philadelphia	Mar 28*c*
	Pittsburgh	Feb 15*f*
	Scranton	Mar 14*f*
SC	Columbia	Mar 20*c*
TN	Knoxville	Mar 27*
	Memphis	Feb 8*c*
TX	Austin	Mar 9*c*
	Dallas	Feb 6*cfp* Mar 6*cfl*
	Fort Worth	Feb 13*f*
	Houston	Feb 1*fl* Mar 8*cf*
	San Antonio	Mar 13*c*
UT	Salt Lake City	Feb 1*c* Mar 7*l*
VA	Newport	Mar 13*f*#
	Richmond	Mar 22*f*#
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	Spokane	Mar 13
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COMPWORLD

Re-engineering is IS priority

BY CLINTON WILDER
CW STAFF

CAMBRIDGE, Mass. — Strategic systems are out. Fundamentally reshaping current business processes with information technology is in.

In the annual survey of North American and European senior information systems executives conducted by Index Group, Inc., "reshaping business processes" through information technology jumped to the top of the list among the 20 issues of highest concern. The issue made one of the most dramatic leaps in the survey's three-year history, being ranked 11th in 1989 among North American respondents and 17th among Europeans.

The closely related issue of instituting cross-functional IS was rated third by both groups. By contrast, "using IS for competitive breakthroughs," the No. 1 IS issue last year on both continents, fell to eighth among North American executives and seventh for Europeans.

"The bloom is off that rose," said Gary K. Gulden, a senior vice-president at Index Group. "Everyone looked at strategic systems as the Holy Grail, something to search for. But there are not that many opportunities to fundamentally change the basis of competition with specific systems."

Instead, companies are starting to refocus on fundamentally changing the way they approach traditional business functions, leveraging the information-sharing and communications capabilities of IS. "Strategic systems tend to be external, changing the bridge between you and the customer or supplier," Gulden said. "Re-engineering is searching out the aspects of internal processes that are artifacts of the time before" information technology. He cited Ford Motor Co.'s revamped accounts receivable function [CW, Nov. 6, 1989] as an example.

Top of the charts

Reshaping business processes has vaulted to become the No. 1 concern of 243 U.S. and Canadian IS executives

[illegible]	[illegible]	[illegible]
1	Reshaping business processes through information technology	11
2	Educating senior management on information systems	3
3	Instituting cross-functional IS	7
4	Aligning IS and corporate goals	2
5	IS strategic planning	4
6	Boosting software development productivity	13
7	Utilizing data	6
8	Using IS for competitive breakthroughs	1
9	Developing an information architecture	5
10	Cutting IS costs	14

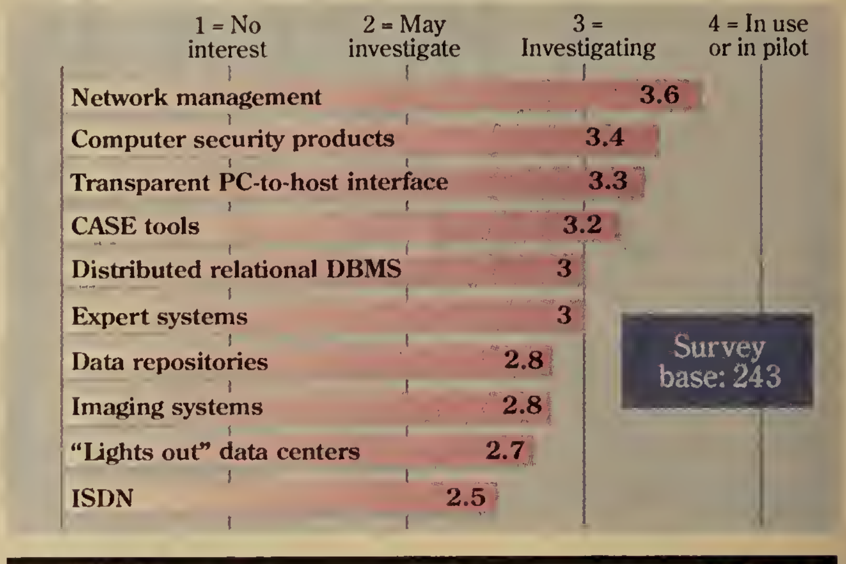
SOURCE: INDEX GROUP, INC. CW CHART: MARIE HAINES

Gulden suggested that managers were distracted by the attention given to systems such as American Airlines' Sabre and McKesson Corp.'s Economost. Instead, they should have focused internally, where changing long-held views about "the way we do things" is much more formidable. "It was convenient to think of [strategic systems] as different, something you could kind of bolt on," he said. "It allowed people to not face up to the reality that business as usual is going to kill us."

Another significant change from the 1989 survey was the elevation of "boosting software development productivity" by North American executives, moving from 13th on the list to sixth. "Although business managers are more involved with systems projects, they still view IS professionals as key to producing the needed systems," said Index Group principal George Hathaway. IS managers "are more concerned than ever that they may not be able to fulfill such promises."

What's hot

A survey of IS executives in the U.S. and Canada indicates high interest in new developments in network management and computer security



SOURCE: INDEX GROUP, INC. CW CHART: JOHN YORK

IS executives strongly believe that more user involvement in systems specification is needed. An overwhelming majority, 87% in Europe and 83% in North America, agreed that "getting the systems requirements right is the key to producing successful IS."

Computer-aided software engineering tools ranked fourth in interest level on a list of 33 new technologies that respondents were asked about. The top three were network management, computer security products and transparent personal computer-to-host interfaces, reflecting increased significance of distributed systems and databases and cooperative processing. Relational databases placed fifth.

Two hundred and forty-three U.S. and Canadian respondents and 92 European executives were polled in the October 1989 survey. In the U.S. and Canada, 86% of the respondents said they were the top IS executives in their companies.

Novell finally releases multiserver software

BY JIM NASH
CW STAFF

SANTA CLARA, Calif. — Novell, Inc. may have temporarily disarmed some of its more vocal critics. After years of watching its competitors simplify their local-area network management programs, Novell last week announced global-naming and remote-management software.

Novell users expressed varying degrees of enthusiasm for Netware Naming Service and Remote Management Facility software, due out this spring. Many analysts, however, continue to criticize the software maker for such a late — and tentative — debut on the multiserver management stage.

Marc Dodge, LAN support group manager at United Parcel Service, said he is anxious to test the new software. Further growth of UPS' 400-server network demands simplified database and application management, he said.

While Dodge anticipates a less centralized IS department at UPS in the next few years, quicker and easier remote management software is required today, he said.

Netware Naming Service and Remote Management Facility are designed to free administrators of multiple-server LANs on labor-intensive, on-site maintenance tasks, according to John Edwards, product line manager for Netware 386.

Specifically, Network Naming Service will allow administrators to update applications and databases on several data servers simultaneously. Servers performing related functions will be grouped into domains. Additions and deletions made to each domain will be replicated in each server. Remote Management Facility will allow network managers to perform those and other tasks from servers and workstations remote from a given LAN.

Both software packages, Edwards said, will have multiprotocol connectivity, including MS-DOS, Apple Computer, Inc.'s Macintosh operating system and IBM's OS/2.

David Hoisve, project director at the University of Utah, said he has waited for Novell's new software because of what he said is the company's record of reliability and performance.

"We are very eagerly awaiting [the software], especially as our network grows to a campus-wide network," Hoisve said. The university already has about 35 of its 75 file servers on Netware 386.

As the university's internetwork expands, Hoisve said, he will need software that will make user additions and deletions easier.

Not all Netware users are so upbeat. A system manager for an East Coast utility who requested anonymity said his company will wait for Netware 386 Version 3.1 before picking up Netware Naming Service or Remote Management Facility.

He said it has been his experience that a first revision is necessary to work out enough of the bugs in Novell software.

About time

Given that Novell has taken such a long time to introduce this software, many industry analysts could only offer a mumbled "finally."

"One thing that Novell has been constantly hammered about for years is the server-centric focus of its software," said Gary Kwok at Lanquest. The software, Kwok explained, will bring LAN leaders into rough parity as far as product features are concerned.

Dataquest, Inc.'s David Perrow was less generous. He said that Novell is "playing catch-up." Novell's announcement, Perrow added, will not put it on par with Banyan Systems, Inc., Novell's chief competitor, which has marketed a global-naming service since the mid-1980s.

Banyan, he said, has years of experience with global-naming software — and offers it free with purchases of its Virtual Networking Software setup.

Novell will give global naming and remote management free to registered owners of Netware 386 Version 3.0. Buyers of future versions will pay a one-time fee of $1,995 for each of the companywide software on top of Netware 386's $7,995 price.

Virus

FROM PAGE 1

the material that they want, and of the 1,400 libraries, 772 chose this disk," Erickson said. "We caught most of the disks before they went out."

The few libraries that received the disks have not reported any problems with data being destroyed, she added.

The virus was initially discovered on four stand-alone computers in the Suitland, Md., office of the Data Users Service Division of the Census Bureau on Jan. 22 and was eradicated within 24 hours, said Jim Gorman, a Census Bureau spokesman. It is still unclear how the four computers were infected, he said.

Two days later, on Jan. 25, the bureau discovered that disks slated to be distributed by the GPO had been infected with the same virus, Gorman said.

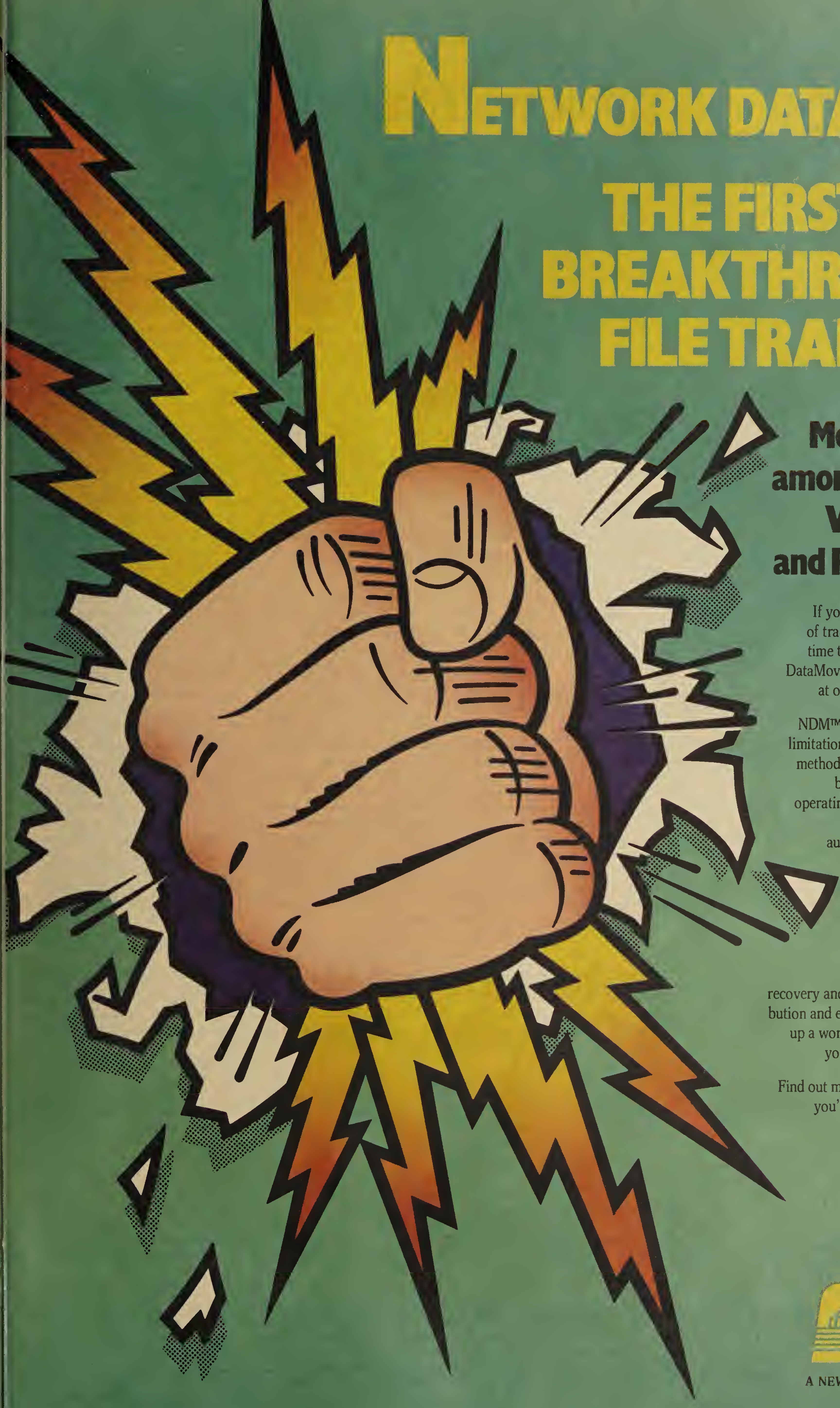
The disks, however, were not produced by the Census Bureau but by an outside disk duplication service, Gorman said. Furthermore, it is not known if the virus was transmitted by the Census Bureau to its disk supplier.

Gorman said that he did not know the name of the disk duplicator or what action, if any, the Bureau intended to take against the firm.

In an alert sent out to its depository librarians, the GPO said that it and the Census Bureau planned to take "appropriate measures . . . to ensure that it does not happen again." Gorman said that he did not know what those measures would be.

The virus had no impact on the Census Bureau's preparations for the 1990 census, Gorman said.

The Computer Virus Industry Association has put out an alert about the virus to its members, warning them that the disk should be destroyed immediately, McAfee said. The virus is easily transmitted and can destroy programs, he warned.



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NEWS SHORTS

New bug in 486

Another bug in Intel Corp.'s 80486 microprocessor has forced Compaq Computer Corp. and Hewlett-Packard Co. to delay shipments of their Extended Industry Standard Architecture (EISA) systems. But Intel officials said the problem can be circumvented by adding logic devices outside of the chip instead of waiting for a reworked version of the CPU. The glitch affects EISA systems but not those using the Micro Channel Architecture or AT bus design. HP and Compaq officials said they still plan to ship 486 systems by the end of March.

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NSF funds storage research

Carnegie-Mellon University was awarded National Science Foundation funding last week for a research center to study magnetic and magneto-optic recording technologies. The technologies will be used to store data in future high-performance computer systems and will also be used in high-definition television recording, according to the school. The funds could total $18.2 million over five years.

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Japanese lab buys super

ATR Auditory and Visual Perception Research Laboratories of Japan has purchased a 16,000-processor, highly parallel Thinking Machines Corp. CM-2 supercomputer. It was the first sale of a highly parallel supercomputer to Japan, the vendor said. The machine will be used to develop visual pattern and speech recognition man-to-machine interfaces.

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AT&T wins Met Life pact

Metropolitan Life Insurance Co. last week awarded AT&T a $132 million-plus, five-year communications contract for AT&T to provide the insurer with customized voice and data service for all domestic and international services. Met Life, headquartered in New York, has more than 1,500 locations.

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Bill seeks to regulate Caller ID

U.S. Sen. Herbert Kohl (D-Wis.) last week introduced a bill that would regulate Caller ID, a telephone service that automatically divulges the caller's phone number (see story, page 67). Kohl said his Telephone Privacy Act of 1990 would require telephone companies to give callers the option to protect their privacy by blocking the display of their numbers.

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Cabernet 3090?

Citibank N.A. is setting up shop in California's wine country, Napa Valley. The bank will consolidate some of its California information systems operations and update them in a state-of-the-art, 150,000 sq-ft data center. The new center will be highly automated and not "people-intensive," the bank said.

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Bank airs image plans

Bank of Boston went public with its plans to use IBM's high-end imaging system last week. The bank, which has assets of $37 billion, has a pilot project under way to automate its record control department. The goal is to reduce by one-third the number of folders handled manually each day. The IBM Imageplus software program is running under MVS/ESA, and it will manage the electronic folders' flow through the bank.

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X/Open pairs with APIA

Two leading proponents of system-independent electronic mail services joined forces last week. The X/Open Co. Ltd. consortium and the 13-month-old X.400 Application Program Interface Association (APIA) said they would jointly develop application program interfaces (API) for the X.400 messaging and X.500 electronic directory standard. The two groups said they will submit their API specifications to the IEEE with an eye toward making them IEEE standards. Last June, the X.400 APIA published the X.400 Gateway API specification; the X/Open Co. Ltd., which claims many of the same members as APIA, has been working on an X.500 standard.

Apple restructures, loses exec

BY JAMES DALY
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. embarked on a major effort to get its house in order last week with a dramatic top-level reshuffling that included the resignation of the head of its domestic division, the appointment of a chief operating officer and the reassignment of key internal responsibilities.

Former Apple *exec Allan Loren*

The departure of Apple USA President Allan Z. Loren followed months of stagnating domestic sales and increasing reports of friction between Loren and top Apple executives.

Loren had little experience in the personal computer business when he arrived at Apple in 1987. But he had both information systems management experience and executive experience as president of Cigna Systems, the IS group of Cigna Corp. He rose quickly in Apple's organization and at one time was considered a possible successor to Chief Executive Officer John Sculley.

However, a recent spate of ineffective marketing programs, poorly-received departmental adjustments and Loren's perceived abrasiveness left him enemies in the ranks. Recently, an anonymous letter circulating within Apple blamed Loren for instituting "reorganization after reorganization after reorganization to the point of creating total confusion, lowering morale and indirectly losing focus."

Assuming the position of COO at the $5 billion company will be Michael H. Spindler, a West German native who moves into the No. 2 spot after serving as president of the highly successful Apple Europe division. Spindler, 47, is a 10-year Apple veteran with a background in engineering, sales and marketing.

Analysts said Spindler's past is likely to mesh well with Apple's future. Apple's European sales are strong in the business sector and have foreshadowed domestic moves to refocus marketing efforts away from Apple's traditional consumer market base and toward high-ticket sales to Fortune 500 customers. The expected introduction of the high-end Macintosh IIXI expected next month should further that thrust.

The adjustments were seen as the kick that Apple needs to get its domestic engines revving. "Computer companies reorganize for the same reason most people buy new suits: They get sick of an old style and start looking around for a new one," said Laura Lederman, an analyst at Duff & Phelps, Inc., a research firm in Chicago.

Some observers saw the moves as a possible reversal for Apple Products President Jean-Louis Gassee. Spindler will assume control of worldwide product marketing and manufacturing — responsibilities formerly held by Gassee.

Sculley defended the realignments during last week's stockholder's meeting as a way to develop new products and get them to market faster. "We're turning up the fire," he said during the 80-minute meeting. "We need to make things happen in a more tightly integrated manner."

Macintosh challenge

Part of the problem, analysts said, is that Apple has not maintained the technological edge that propelled it to fame and fortune. The uniqueness of the Macintosh's easy-to-use graphical user interface, for instance, is now challenged by similar interfaces like IBM's Presentation Manager and Microsoft Corp.'s Windows. Apple computers are also typically priced higher than many of the more powerful IBM Personal Computer clones.

This imbalance hit Apple's pocketbook last month when first-quarter profits fell 11% to $124.8 million. Last month, the company pared projections for 1990 revenue growth from 20% to 10% due to poor U.S. sales. Sculley has announced a series of cost-cutting measures that call for an unspecified number of layoffs by the end of March.

Analysts said that Spindler's chief concern should be in getting a low-cost Macintosh out the door. "Apple didn't keep the home fires burning on the low end, and they're paying for it," said Benny Lorenzo, an analyst at Volpe, Covington & Welty in San Francisco. Current speculation is that a $1,000 Mac will be out by September, with a color version available by the first quarter of 1991.

Suspect arrested in AIDS disk fraud case

BY MICHAEL ALEXANDER
CW STAFF

CLEVELAND — Acting on a warrant issued by a London magistrate, agents of the Federal Bureau of Investigation arrested Dr. Joseph Lewis Popp last Thursday for his alleged role in a scheme to bilk computer users who used a program that he created.

Popp, an U.S. citizen, is alleged to be the author of an "AIDS Information Introductory Diskette" that was mailed unsolicited to thousands of MS-DOS computer users in Europe, Africa and Australia last December.

Concealed within the program, which was designed to evaluate a person's likelihood of contracting the Acquired Immune Deficiency Syndrome (AIDS) virus, was a Trojan horse that moved some files stored on hard disks into hidden directories and encrypted others.

"The effect for the nontechnical user is devastating because it appears as though everything is gone," said Jim Bates, a computer consultant in Leicester, England, who has dissected the program.

A license agreement packaged with the AIDS disk warned users that the program would adversely affect programs on their personal computer's hard disk drive unless they agreed to lease the program with 365 uses for $189, or for the "lifetime of your hard disk" for $398. Users were directed to send a check to an address in Panama City, Panama.

It has been estimated that between 23,000 and 27,000 disks were mailed to unsuspecting users, according to Bates. There have been no reports of the program's arrival in the U.S.

English law enforcement authorities issued a warrant for Popp's arrest on Jan. 15 for allegedly violating a 1968 blackmail and extortion statute, said assistant U.S. Attorney Gary Arbeznik in Cleveland.

Popp, 39, is being held without bail following a bond hearing last Friday. It is not known whether he will fight extradition (hearings are expected to be concluded within the next 60 days).

Popp, who has a Ph.D. in anthropology, is believed to have once worked for the World Health Organization (WHO), whose members were among those who received the AIDS disk.

A WHO spokesman in Washington, D.C., said that Popp is not currently employed by the organization.

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Host options open for telemarket tools

BY ELISABETH HORWITT
CW STAFF

AT&T and Aristocom International, Inc. introduced software last week that is said to automatically set up transactions under IBM CICS host environments for exchanging information with AT&T private branch exchanges, or PBX.

The application will be of use to service and telemarketing agents who can realize productivity gains of 10% through an application that identifies the caller's telephone number and uses it to automatically pull up the caller's file on the agent's screen just as the call comes in, according to Boston-based consulting firm The Yankee Group.

An internal study conducted by American Express Co. Travel Related Services reported a 16% gain from such applications [CW, Jan. 29].

What users such as AT&T subsidiary American Transtech are waiting for is the completion of a CCITT standard for interfacing various PBX systems and host software environments, telecommunications manager Todd Stevenson said.

AT&T and Aristocom have announced new members of Aristocom's Switch Computer Interface Link family that are said to provide transaction links between AT&T Definity PBXs and IBM CICS application environments.

One product reportedly works with AT&T's Integrated Services Digital Network Gateway, the other with AT&T's Integrated Telemarketing Gateway. The products are scheduled to be available by the end of this quarter.

No ISDN site is an island, with X.25 link

BY ELISABETH HORWITT
CW STAFF

MORRISTOWN, N.J. — Users stranded on Integrated Services Digital Network islands, pining away for ISDN-based connections to other corporate sites around the country, may soon gain at least a stopgap solution: a high-speed ISDN connection to X.25 packet-switched networks.

AT&T Network Systems recently released software to the local exchange carriers that is said to allow AT&T's No. 5ESS ISDN central office switches to handle on-demand X.25 packet-switched connections over an ISDN B channel.

Shearson Lehman Hutton, Inc. is in the middle of a project to evaluate various ISDN solutions for supporting multiple video and data sessions between desktop conferencing workstations and hosts at various corporate sites, according to senior planner Joseph Psalik. The investment firm has already tested out a circuit-switched ISDN connection over an AT&T private branch exchange and plans to check out on-demand B-channel packet switching soon, Psalik said.

Packet switching, in addition to eliminating the need for a data module, could provide more flexible connections among multiple sites as well as a potential link with the outside world, Psalik said.

Previously, users could set up such connections either over the slower, 16K bit/sec. ISDN D channel, or over a "nailed up" B channel. The drawback of a nailed-up or dedicated ISDN connection is that it eliminates the main cost advantage of the switched digital service, which is only having to pay for the connection when it is actually in use.

Southwestern Bell is planning to test interoperability between the B-channel X.25 link and its BT-Tymnet, Inc. packet switches next August. If demand surfaces, a B-channel on-demand X.25 service would be "feasible for next year," product manager Mark Christian said.

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COMP.WORLD

AT&T discovers ISDN switch glitch

BY ELISABETH HORWITT
CW STAFF

MORRISTOWN, N.J. — As if one major switch glitch were not enough, AT&T recently uncovered a software problem on its 5ESS switch, which has occasionally caused one or two Integrated Digital Services Network lines to disappear overnight at some user sites.

The software snafu that isolated a large segment of AT&T's customer base last month [CW, Jan. 22] involved the switches that support the carrier's own network. In contrast, this latest problem arose on the AT&T switches that deliver local carrier services — in particular, those based on ISDN.

West Virginia University had been losing ISDN lines overnight "every two days since we put them up around October," said Jeffrey Fritz, a data communications analyst at the university. The problem did not affect ordinary dial-up ISDN lines, just dedicated lines that were in service around the clock, he added.

A telecommunications manager from another firm said that "our nailed-up ISDN lines intermittently go out of service."

Recently, Chesapeake & Potomac Telephone Companies (C&P) contacted Fritz with the information that the problem did indeed reside in the 5ESS switch — or, more specifically, in the diagnostic software that checks lines for problems, primarily during the night.

Instead of passing over lines that were busy and going back to them later, the software was performing diagnostics on such connections and diagnosing the data as errors, Fritz said. The faulty software would take those lines out of service.

AT&T Network Systems marketing systems consultant Lana Hypes, who works with C&P on customer service issues, confirmed that Fritz's story is "essentially correct; it was a 5ESS software glitch that C&P was able to identify" by monitoring the system. The software to fix the problem is now being distributed to all local-exchange carriers and user firms that use a 5ESS ISDN switch, Hypes said.

Timeplex touts T3 hub

BY ELLIS BOOKER
CW STAFF

WOODCLIFF LAKE, N.J. — Timeplex, Inc. entered the broadband networking arena with a bang last week, introducing a T3 transmission hub, a Fiber Distributed Data Interface (FDDI) router and a group of connectivity and network management systems to tie them all together.

Timeplex's T3 product takes a different approach than its competitors, most of whom have promised to add T3 support into their existing T1 multiplexers.

"Timeplex is saying that rather than add T3, we'll sell you a whole new system," said David Passmore, a partner at the network strategies consulting practice of Ernst & Young in Fairfax, Va. What is significant about this offer, he added, is that Timeplex's Superhub is said to be able to work with *any* vendor's T1 network.

Timeplex's new products include the following:

- The TX3/Superhub, which can terminate up to 10 T3 circuits or a mix of T3/T1s, up to the equivalent of 360 T1s.
- The TX3/Superhub Element Management System (EMS), a network management product for the new broadband hub.
- The Time/LAN 100 Routers for connecting FDDI, Ethernet and Token-Ring local-area networks. To start, the router will support only Transmission Control Protocol/Internet Protocol-based FDDI and Ethernet LANs.
- The Time/LAN 100 EMS, a graphical network management system to control the new routers and concentrators in the product line.

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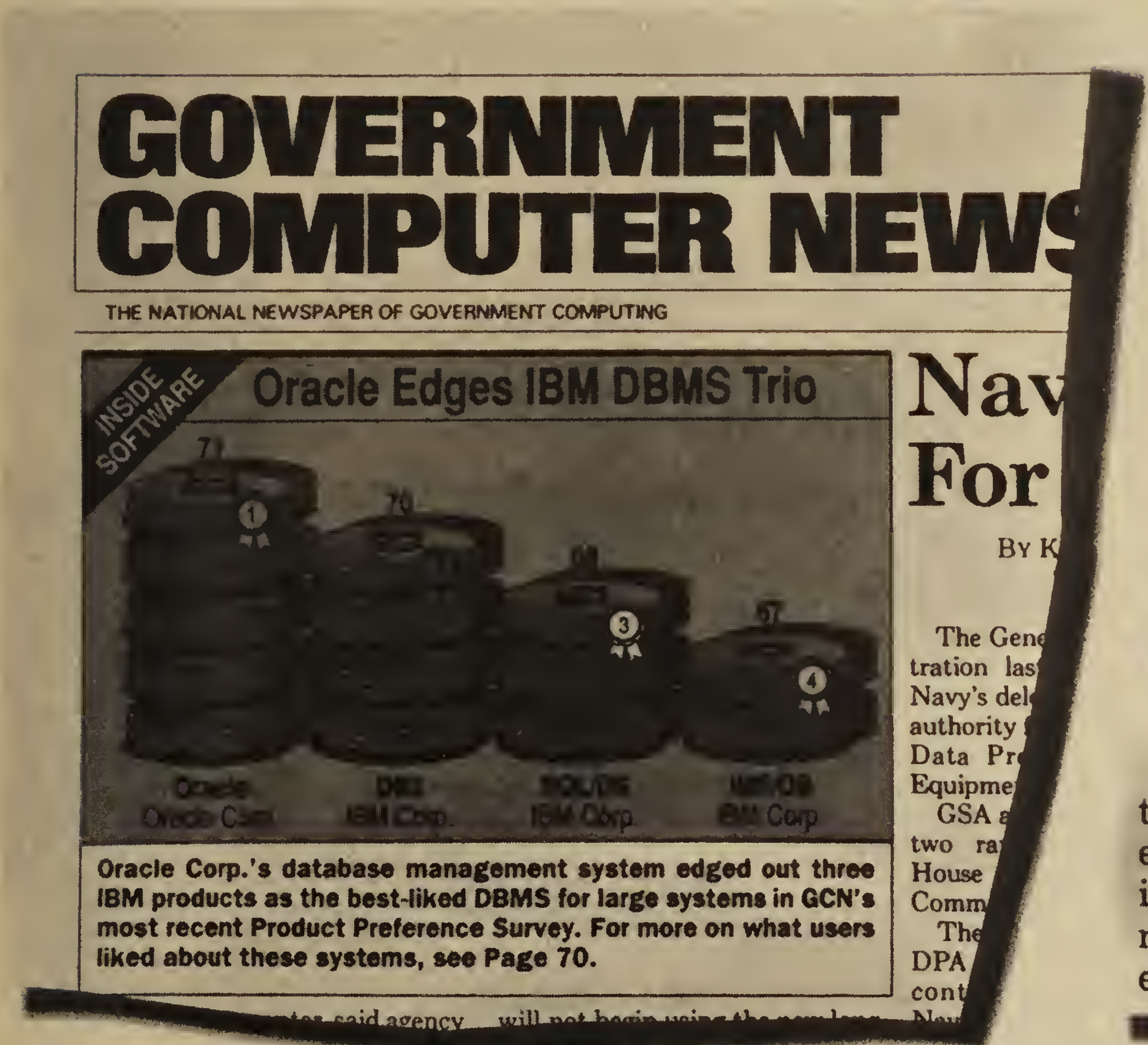
Oracle for IBM Voted Number One on Mainframe.

The Oracle database management system from Oracle Corp. received top marks in a recent GCN survey of federal DBMS users. IBM Corp.'s DB2 came in a close second.

Oracle satisfied its users best in seven of the 12 categories, winning particularly high scores for its hallmark features: distributed operation, SQL interaction and availability for multiple operating systems.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Oracle Edges IBM DBMS Trio
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70
68
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1
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3
4
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DB2 IBM Corp.
SQL/DS IBM Corp.
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Oracle Corp.'s database management system edged out three IBM products as the best-liked DBMS for large systems in GCN's most recent Product Preference Survey. For more on what users liked about these systems, see Page 70.

One Oracle user said, "Processing transactions and providing proper recovery across mainframes and midsized systems in a distributed environment is very important." Another said his organization had just signed a site license agreement to run Oracle on six large IBM systems and 258 Digital Equipment Corp. VAX minicomputers.

Respondents also liked Oracle's documentation, development environment and ease of administration.

DB2 users were less satisfied with its distributed operations and limited operating environment. One said, "DB2 is still playing catch-up to Oracle because DB2 does not provide a true client/server PC front end."

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The age of Meridian migration

BY ELISABETH HORWITT
CW STAFF

NEW YORK — Northern Telecom, Inc. last week finally abolished the forklift upgrade as the only way for users to migrate from its low-end SL-1 private branch exchange (PBX) system to the high-end Meridian SL-100/Supernode switch.

The Meridian 1's key components — an intelligent peripheral module and high-density line cards — can be either used to upgrade an existing SL-1 or SL-100 PBX or installed as a new system, Northern said. The Meridian 1 upgrade allows the two older systems' combined base of 39,000 users to share a common set of peripherals and features and migrate from the SL-1 to the SL-100 while maintaining 80% of their investment, Northern claimed.

"Before this announcement, you had to throw everything out in order to migrate from the SL-1 to the SL-100," said Northern Telecom Communications Systems Vice-President Pete Ianace.

"A lot of companies own both SL-1s and SL-100s, and a lot of SL-1 users were looking for features that SL-100 users enjoyed and vice versa," said Ted Speakman, president of the international SL-1 users association.

In addition, Northern's provision of "universal hardware and software compatibility" between U.S. and overseas versions of the two switches is a big plus to international corporations, Speakman said.

Since the two switch lines remain distinct, retaining some unique features, Northern's migration path "is not seamless," according to Greg Carlsted, director of the telecommunications industry service at Dataquest, Inc. Another drawback to the introduction is that "50% of it is futures," including an ISDN Basic Rate Interface card that will not be available until the second half of next year, he added.

> "BEFORE THIS announcement, you had to throw everything out in order to migrate from the SL-1 to the SL-100."
>
> PETE IANACE
> NORTHERN TELECOM

The Meridian 1's intelligent peripheral module is said to enhance the SL-1's and SL-100's ability to deal with demanding networking applications by providing added processing power as well as a high-speed fiber-optic connection, Ianace said.

First National Bank of Boston currently uses the SL-100 to move "very little for data now, but [the Meridian 1] could change that because of its fiber connection and greater throughput," said James Candito, the bank's senior telecommunications manager. The company is considering Meridian 1 both as an Integrated Services Digital Network switch as well as for such data networking applications as LAN-to-LAN connectivity, he added.

The initial Meridian 1 product will provide these features:

- An intelligent peripheral module that is necessary for either system to support Meridian 1 features and peripherals.
- High-density digital line cards that are said to support 16 voice and 16 data ports, or double the capacity of existing SL-1 and SL-100 cards.

Most Meridian 1 enhancements and peripherals will be available late this year through the first half of next year.

Analysts were told that as part of a refocusing from hardware to applications, Northern was introducing a pricing structure that would include a base hardware price, plus charges based on application type and usage volume, Carlsted said.

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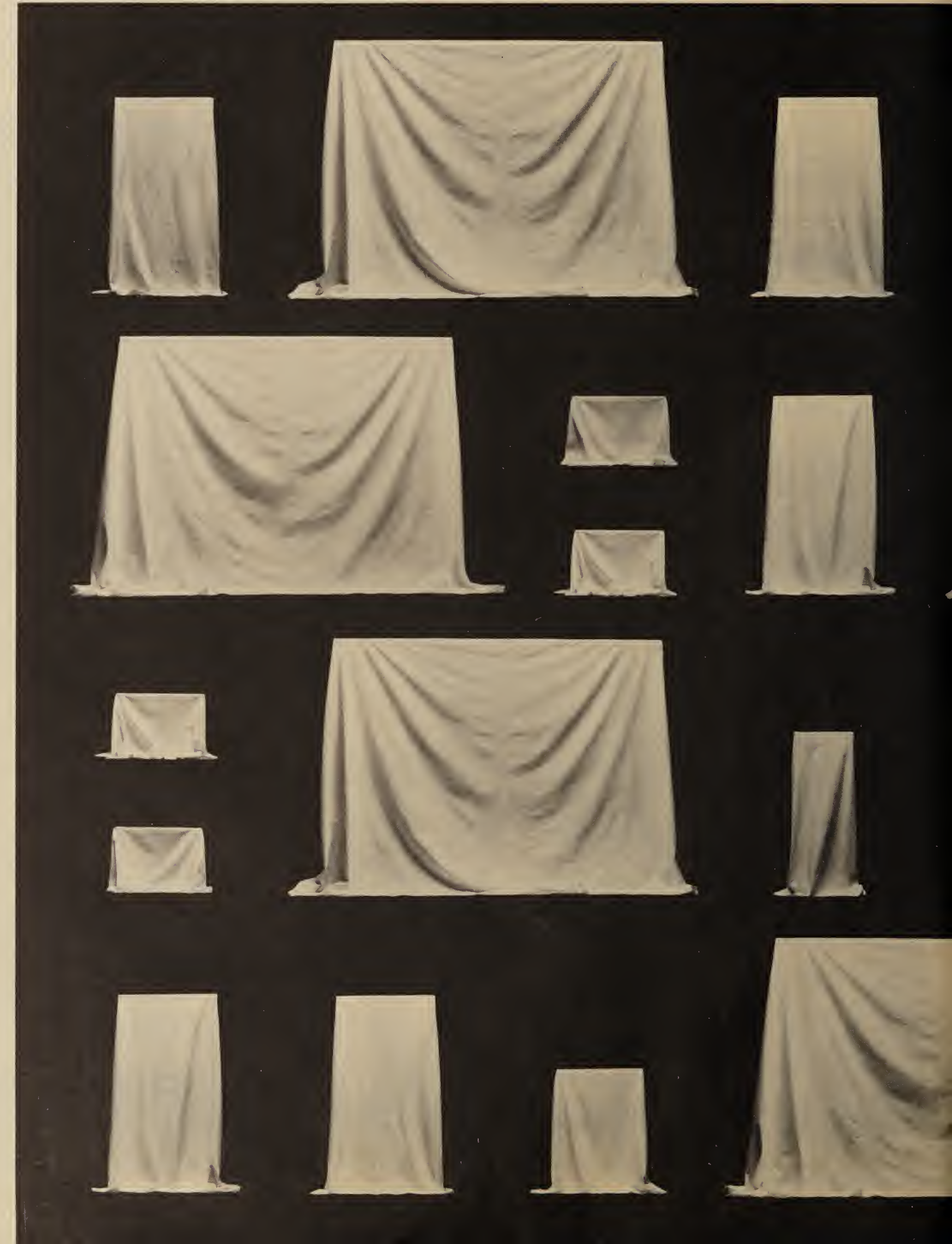

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ADVANCED TECHNOLOGY

Petitioning the gods of distributed computing

MIT's Project Athena provides a fertile testing ground for the latest techniques in intercommunication

BY MARYFRAN JOHNSON
CW STAFF

Donna Coveney

An estimated 90% *of MIT undergraduates use the Athena system*

What Professor Earll Murman calls "the fax effect" would make the Greek Goddess of Wisdom proud.

Athena's namesake at MIT, Project Athena, has evolved during the past eight years from an academic experiment into a $100 million project in distributed computing.

The Cambridge, Mass., university's cache of Unix-based workstations has grown to a campuswide integrated network of 1,031 machines, making it what may be the largest centrally managed single-site installation of workstations in the world. "With workstations so widely distributed, it provides what I'd call the 'fax effect,' " Murman said. "If you know there are enough of them around, you use them. Availability has almost become taken for granted."

Athena's offspring

Largely underwritten by IBM and Digital Equipment Corp., the Athena Project has given birth to burgeoning industry standards in open architectures, such as the X Window System graphical user interface, X Toolkit and the Kerberos user authentication system.

Just last month, MIT chose as its standard user interface the Open Software Foundation's Motif. Several of the utilities embedded in OSF/Motif, such as on-line consulting, were developed under research grants at MIT.

Among its educational bonanzas, Athena boasts 125 MIT faculty-developed software packages — four of which have won national awards — that now account for roughly 60 computer-based course supplements in subjects such as architecture, biology, economics, engineering, political science, linguistics and philosophy.

Several large universities are considering installation of the Athena system, whose underlying architecture solves management issues presented by a large distributed system.

That solution stems from Athena's unique computing model, which combines the best aspects of a mainframe time-sharing system with the PC model of users controlling their CPU and resources, Murman said.

"Athena blends these two computing models by giving every user full access to a single CPU on Unix workstations, while having central services moved to a server that all users can access," said the director, whose academic background includes three Princeton University degrees in aeronautical engineering and mechanical sciences.

The central services Athena provides encompass everything from electronic mail, messaging and file storage to printing, on-line consulting and access to Internet.

At the university, where the magnetic core memory used in computers was invented 40 years ago, an estimated 90% of the undergraduates and at least half the graduate students now have Athena accounts.

Students can sit at any one of hundreds of networked IBM or DEC workstations in more than 40 locations and log on with their personal password, gaining immediate access to their private files. They can electronically pick up and turn in assignments, write papers, message one another and their teachers or run queries through an on-line consultant.

The system is up around the clock, every day of the year, handling an average of 2,200 log-ons daily. On Christmas Day last year, 95 users signed on.

Athena's heart is in the "Fishbowl," a glass-walled computer laboratory off MIT's famed "infinite corridor," the main hallway that stretches several city blocks. The equipment alone is valued at about $36 million and includes 83 printers and 67 server machines.

The university's partnership with IBM and DEC expires in June 1991, and the faculty is busy drafting plans for Athena's teenage years. One emphasis in the 1990s will be providing Athena-based services to PCs and Apple Computer, Inc. Macintoshes around campus. "There is a large base of PCs on campus, and Unix workstations are not yet what I would call consumer items," Murman said. "An integrated campus computing model will be an important next step."

Other areas of exploration for Athena will include multimedia and interactive video, he added.

Software gives computer literacy a whole new twist

BY MICHAEL ALEXANDER
CW STAFF

With the right software, a personal computer can be programmed to read and comprehend text as well as the average high school student. At least that is the contention of Management Information Technologies, Inc. (MITI), a small software publisher that has devised a new class of software that it calls "readware."

The Washington, D.C.-based company, which has received a patent for its readware technology, says that its software enables a PC to recognize and draw precisely measured associations between words. Text that has been scanned and entered into a database can be searched and highlighted to relate meaningfully to an idea or point of fact without resorting to a specific word, said Chief Executive Officer Tom Ewell.

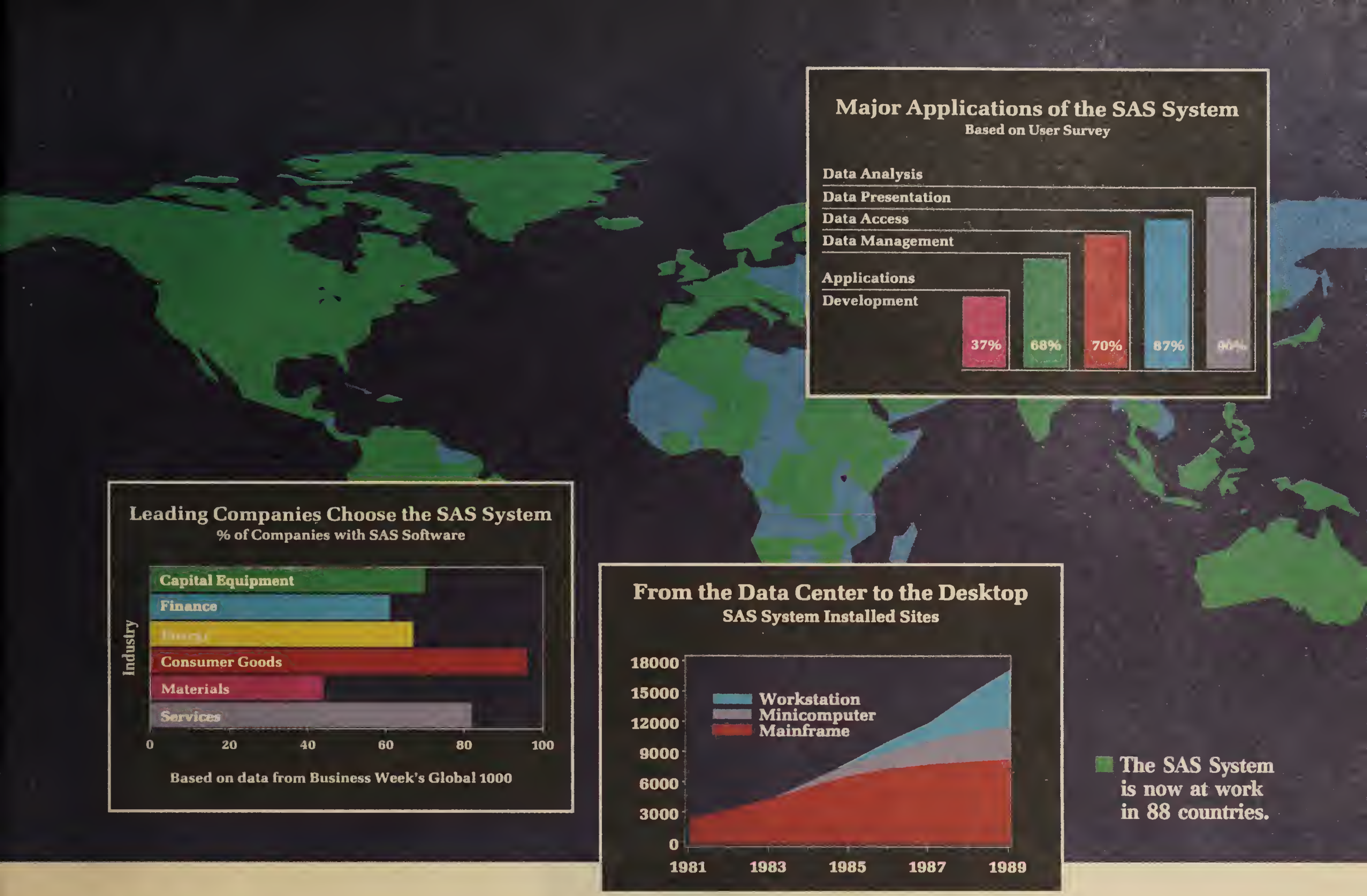
A user could retrieve from a magazine article about the Soviet Union, for example, reasons that one may be pessimistic about the future of the Soviet economy. Factors that could affect the economy, such as trade imbalances and civil unrest, might be among the information that is referenced without the user ever having entered the word "pessimism."

Conventional text retrieval software requires the user to stick with prearranged links between meaningful parts of text, Ewell said. The user must know precisely what he is looking for and how it is represented in the text in order to retrieve it, he said. Newer text-retrieval applications, such as hypertext, have made culling information from large databases easier but still require the user to stick to a rigid and explicit syntax.

Readware, on the other hand, is based on a new field of "letter semantics," which Ewell described as the "mechanics of how the mind deals with points, symbols and figures." Words and parts of words have been transformed into numbers so that the process of text retrieval is not merely matching words in queries to those in an index but one of calculating relationships between words that have similar roots or parts.

Words have been translated into a patented matrix and software algorithms, thus making it possible for a user to find parallels between any word, not only in English but in any alphabetic language. "Just as we have a periodic table of elements that decribe basic particles of nature, we're saying that the same thing is true of language," Ewell said. "The letters are the atoms of that language, and words are like chemical compounds."

The firm is preparing to market its first readware product, The Research Assistant, for IBM and compatible computers. It will cost $795.



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EDITORIAL

Reshaping up

Whatever happened to using information systems for some good old-fashioned competitive edge?

It seems as if senior IS executives are narrowing their field of vision, or at least focusing more specifically on the here and now. That is what the third-annual IS management survey from Cambridge, Mass.-based Index Group appears to indicate (see story page 6.)

Its poll of some 335 IS managers in both the U.S. and Europe showed a surprising surge in the issue of "reshaping business processes through information technology" as the dominant issue in 1990. This issue was rated 11th out of 20 issues in 1989 in the U.S. and 17th in Europe last year.

Meanwhile, the issue of "using IS for competitive breakthroughs" fell from the No. 1 spot in both the U.S. and Europe last year to eighth and seventh, respectively.

What's going on? More than likely, the demands of a weak economy in the U.S., where cost control is becoming paramount, and demands of booming economies in Europe, where agility and dynamicism are requisite, have IS managers tending to more localized problems and agendas than focusing on the global competitiveness of their companies.

Is this a throwback to the early days of automation? Not really, because implicit in reshaping business processes is understanding what those processes are and what they mean to the company. Therein lies the ongoing challenge and secret of success in the IS suite.

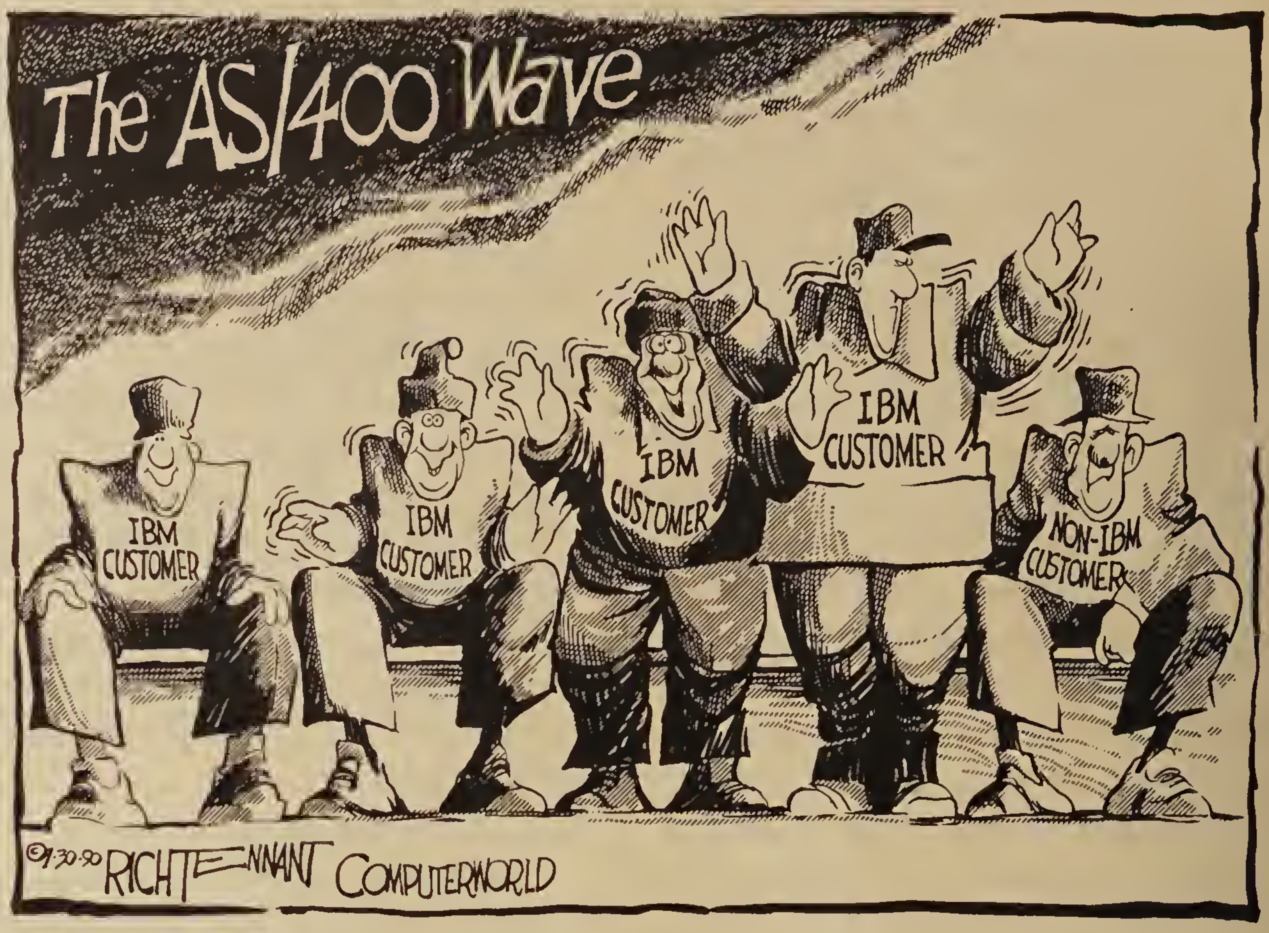
The users speak

Fairly often — four times a year, in fact — we send out 2,000 questionnaires to randomly selected readers. They provided us a with a barometer of their reading needs and how we're doing at filling those needs.

In each of these studies for the past few years readers have consistently rated "comparative product analyses," "new technology analyses" and "implementing new technologies" among the top areas of coverage desired. Earlier last month, *Computerworld* inaugurated a weekly section called Advanced Technology in response to the latter two reader demands.

This week we are breaking more new ground with the debut of a monthly Buyers' Scorecard, which is designed to be the most comprehensive and unimpeachable comparative product review available to readers of any publication.

Can we make such a claim? Unlike some lab bench reviews that may reflect the prejudices of individual reviewers, Buyers' Scorecard is the distillation of the successes, near-successes and failures of key products as expressed by users in the field. Each review solicits the opinions, often by telephone, of key customers of the products being analyzed. If we are careful with the questions we ask (and we employ independent consultants to help), the results are unimpeachable.



LETTERS TO THE EDITOR

No perfect match

The article on industry aftershock [CW, Dec. 11, 1989], featured several quotes by David Wu of S.G. Warburg & Co. Either he was misquoted or he does not understand the IBM product line.

He is quoted as saying "I'd can the 9370. Do you really need a 4381? Can't you just bring in an AS/400?" Anyone in the mainframe/midrange IBM customer base is aware of the similarities and differences among the three systems mentioned. With the right operating system, you may move programs between the first two; however, you cannot run programs from them on the third. Or doesn't conversion of an entire shop's application software come into play when an analyst wants to be quoted?

Vincent J. Battaglia
Director of MIS
Clipper Express
Lemont, Ill.

Giving up too fast

In "Outsourcing: The great debate" [CW, Dec. 11, 1989], William Morgan and Stefan Gladyszewski take opposite sides on the outsourcing issue, yet both miss the point and are still not looking to the 90s.

The current cost-cutting practices of outsourcing information systems may lead to business failures in the 1990s. Many companies are rising to the challenge of recognizing the potential of modern IS. However, many companies are still living in the past, as if computers were still just used to process the payroll and general ledger. For the sake of showing more profitability on the books today instead of tomorrow, organizations are outsourcing their lifeblood and mortgaging their future.

Subcontracting support functions in organizations is nothing new. Witness the services of firms in manufacturing and building maintenance. As valuable as these subcontracting services are to an organization, they are not central to the organization's competitive success. IS functions are vital to a company because IS exists to search out, develop and install applications that assist businesses in achieving their strategic goals.

Morgan of Copperweld Corp. outsourced his IS and thus handed over to outsiders the neural network of his organization. He claims he did not give up control over resources because he kept an in-house person to manage and oversee all of the outsourcing vendor's activities. Perhaps any cost savings that Copperweld Corp. could get by outsourcing could have been matched internally. In addition, Morgan and others make the outsourcing decision only for cost/benefit reasons.

Perhaps a need exists for another means of assessment, and future-oriented managers will see that IS provides a competitive advantage if properly integrated into a corporate structure.

By keeping IS in-house, budgets will more readily maintain state-of-the-art technology. More control can be exercised over projects and decision-making. Moreover, advancing IS provides an approach to one of management's oldest organizational problems — how to effectively manage interdependence of an organization.

Investment in technology must bring with it organizational change; thus, in some cases, outsourcing may make sense. Yet, companies need to retrain people and restructure operations to optimize the impact/alignment of technology on the business before they try to optimize their bottom line and mortgage their future.

Eric Goldfarb
Ann Arbor, Mich.

No, *that* award

It was encouraging to see your excellent coverage get a citation for the recognition Leo Burnett's sophisticated local-area network recently received for its Star Reachers Network [CW, Dec. 18, 1989]. For the record, however, the single-site user award received was an Enterprise Network Excellence (ENNE) award presented after a nationwide competition among enterprise networks that have significantly improved the company's bottom line.

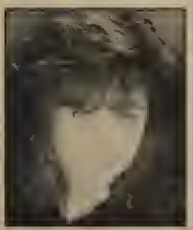
The ENNE competition is currently under way for 1990 and will be presented at an industry dinner during the Networld show in Dallas. The award competition is sponsored and produced by *Network World* and Networld. To my knowledge, there is no Enterprise Networking Institute, although there is an Enterprise Networking Academy in the works.

Stephen M. Yesenosky
Executive Director
ENNE Awards Program
New York

Computerworld *welcomes comments from its readers. Address all letters to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701. Fax: (508) 875-8931; MCI Mail: COMPUTERWORLD.*

A research/funding trade-off

SABINA SKULSKY



Recently, there has been a lot in the news about U.S. universities aiding foreign — primarily Japanese — firms by trading research for funding. As a student at MIT's Sloan School of Management, I've become especially interested in the subject.

MIT's industrial liaison program, which charges 275 corporations a total of $8 million per year for access to research that is hot off the computer screens and fresh out of the test tubes, is at the forefront of such business/university joint ventures.

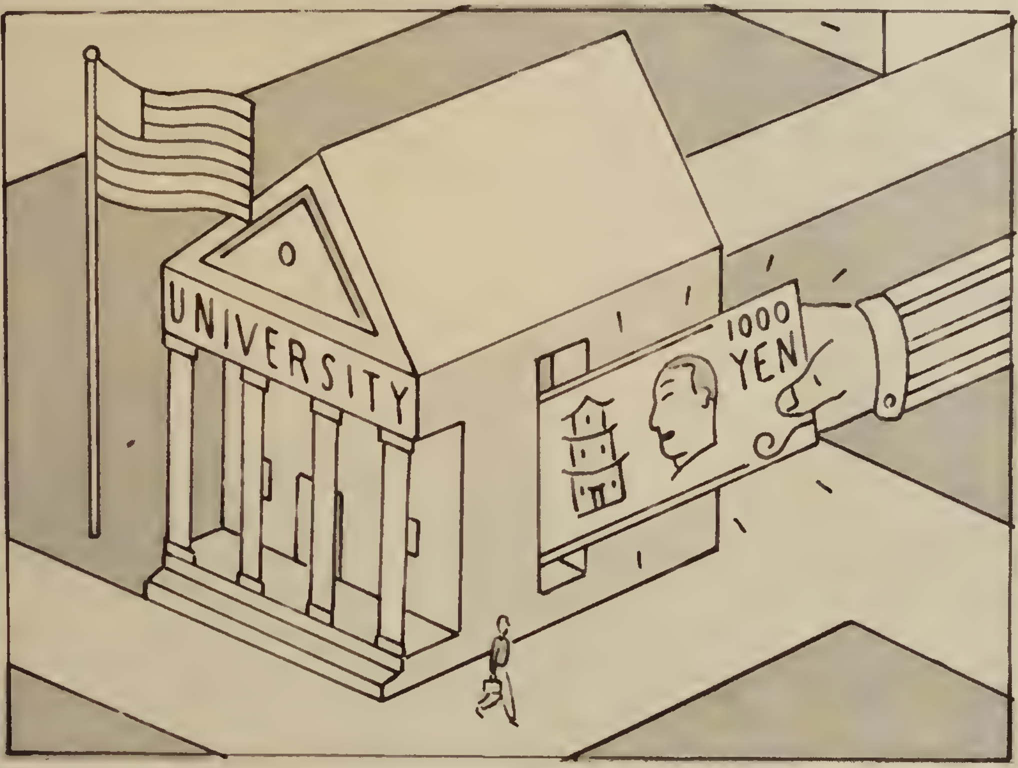
Opponents of the program feel that funneling research discoveries to foreign firms harms U.S. competitiveness. They also believe that *any* industrial liaison necessitates commercialization of the university and therefore compromises the purity and independence of scientific research.

During a six-hour hearing, a congressional subcommittee confronted MIT President Paul Gray with these charges. Gray countered that all information granted is publicly available. Therefore, U.S. corporations are also free to use the program to gain international competitiveness.

There are many arguments in favor of the industrial liaison program and many reasons for the strong foreign representation. The program itself is warranted primarily by MIT's need for funding. Research cannot subsidize itself. The "purity of science" argument does not stand up because the purity is sullied by the competition. It would seem that the subcommittee members are advocating that universities stand apart from this rat race. However, they also argue that universities should support the need to boost U.S. competitiveness. Thus, they are contradicting themselves.

As to the composition of the industrial liaison program, Sloan's Dean Lester Thurow points out that U.S. companies are not always eager to either accept help or to invest in the program in the long run. He laments this insularity, stating that it's easier to say the rest of the world is cheating or being unfairly helped. America, he says, must look to its basics, such as education and manufacturing.

Moreover, with respect to the widespread Japanphobia, Thurow points to West Germany's larger per-capita trade surplus to emphasize that though Japan's products are more noticeable, Japan is by no means our sole threat. Perhaps the biggest threat is not Japan or even West Germany but that of far too narrow definitions of company and university.



Stephen Turk

For example, in these days of international markets and competition, what exactly is an "American company"? If only American companies were allowed in the colloquium, MIT could not communicate with corporations such as IBM or Motorola. For that matter, should MIT be considered an "American university" or a "world university"?

Is the goal of a university to educate only certain students or to educate all who meet the standards of admission despite nationality? Just as it is becoming increasingly necessary for companies to become global, shouldn't universities also follow the trend?

For that matter, one could think of the university as simply another corporation, operating in the industry of education, producing research and an informed student body. In order for the U.S. to remain competitive in this industry, MIT must go global. Just as U.S. companies rely partially on foreign investment to remain solvent, MIT must also seek support outside national boundaries. If we can view the liaison program as simply a means to rally this support, then accusations of compromise and commercialization are unfounded.

However, even if we were to accept this argument, some lingering doubts remain. In a recent *Wall Street Journal* article, McKinsey-Japan, Inc. Director Kenichi Ohmae comments on the schizophrenia arising from the realities of a global economy on the one hand and fear and distrust on the other. Globalization is threatening to the concept of democracy — the concept that individual countries should be self-determining.

A global village is an attractive concept, yet the implied sacrifice of national independence and identity arouses fear and doubt. With new definitions of company, university and even country, come many dilemmas.

The pros have it

However, the advantages of a global village in which university/business ties and foreign investment are accepted far outweigh these drawbacks. Not only are these ties necessary for continued economic solvency, but they have inherent value.

The strengthening of the university/business link has speeded the time required to turn research into usable technology. I'm not sure that closer partnerships between nations will completely eradicate all the differences that are necessary for cultural uniqueness.

Though common languages and norms for international business communication may develop, these will not threaten the underlying core of individuality and independence of each nation. Through acknowledging the resulting advantages, much of the confusion can be resolved.

Skulsky is a graduate student at MIT's Sloan School of Management concentrating in corporate strategy and operations research.

Announcing finalists for the 'Buzzword of the '90s'

ROBERT GLASS

Decades tend to be characterized by their buzzwords. The main buzzword of the 1970s was "structured." We structured everything from analysis and design to documentation, but it didn't seem to solve the overall problems of building software. The buzzword of the 1980s was "productivity." Everyone talked about it, but hardly anyone did anything significant about it.

What will the buzzword be in the '90s? It's important to try to know in advance. After all, without the latest buzzword to lean on, how can we software folks focus what we write and say to those willing to listen to us?

Waiting in the wings is a contending group of factions with a contending cluster of buzzwords, ready to fight it out for the title.

I would like to announce the leading nominations for the buzzword of the '90s.

Food for thought

There are essentially three sources of software buzzwords. Each of the following factions is already actively backing its nominations:

- The entrepreneurs who sell promising new ideas to practitioners whether they are helpful or not.
- The academics who sell brilliant new ideas to research funding sources whether they are helpful or not.
- The technology-transfer specialists who sort through the work of the entrepreneurs and the academics looking for ideas worth passing on to the practitioners whether they are ready for them or not.

What are the buzzwords these groups propose?

Information engineering is the first nomination of the entrepreneurial faction. To understand it, take the top-down notion of the '70s structured revolution and apply it to the corporate institution and not just to software. This one looks like a sure winner — hardly anyone ever argued that top-down approaches to software were bad.

Enterprise is the second nomination of the entrepreneurs, and it is linked to the first. "Information engineering will improve the data processing of the enterprise," we will all learn to say. We used to say "corporate institution" or some such phrase, but it's a new decade and we can all learn a new way of expressing ourselves.

Paradigm is the first nomination of the academics. It has just the right touch of mystery and exclusiveness — and only the in-group will be able to pronounce it (hard "i," silent "g"). It means "a model of how things should be done," and who can argue with the need for more of those?

Metaphor is the next candidate of the academics. It means "something that represents something else for the purpose of comparison or analogy." There is a distant family relationship to the earlier academic buzzword "abstraction," and thus metaphor has a leg up in the buzzword derby.

Repository is a blockbuster candidate, say the entrepreneurs. After all, it builds on the "data dictionary" buzzword of a decade or two ago, and who can resist a hopped-up version of an old favorite?

Oracle is a dark horse academic nominee. It means some kind of authority figure, and don't we all wish we had one of those close at hand?

Process is the nomination of the technology-transfer people, heretofore silent in our nominations. However, there is a method to this single-nominee madness; after all, process covers just about all of the the other buzzwords in this list. A generic buzzword could be the winner this decade.

Object-oriented is the last-but-not-least nominee of the academics. The bandwagon for this nominee is already well under way. This may be a top candidate for the 1990s. In fact, it is the only buzzword nomination that is nominated by one group (the academics) and seconded by another (the entrepreneurs).

There you have it. Now don't just chuckle or frown and forget these words — work on them a little bit, for the sake of your career.

The *information engineering* success of the *enterprise* may well depend on your placing these *objects* in your personal *repository*. At least, they will determine the success of the *paradigm* that you as an *oracle* choose to employ. It will only be through the *process* of trying to master them that you will realize that they represent a *metaphor* for real success in the software business, 1990s style.

Glass is president of Computing Trends, a software engineering education and consulting company based in State College, Pa.

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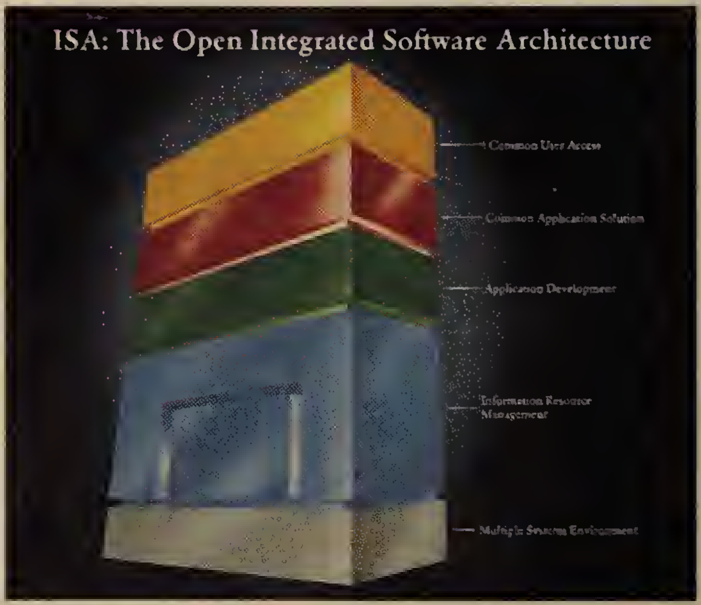
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SYSTEMS & SOFTWARE

HARD TALK

Rosemary Hamilton

Two sides of AS/400 coin

When it comes to the IBM Application System/400, there are really two stories to be told.

One story concerns the big picture and how IBM will do in the overall midrange market. It was told last month in *Computerworld*, and it did not paint the rosiest of pictures for this midrange system. Put simply, the chances for this system to emerge as a leading midrange platform are slim.

However, there's another story, the smaller picture. The one that individual users look at. What matters to them is not so much the AS/400's competitive wins or losses, but what IBM is doing to make their jobs easier and make them rest easier about their futures.

That is not to say that users shouldn't be concerned with the system's competitive performance. But the key here is that even if the AS/400 becomes a lukewarm performer in the overall midrange market, the existing AS/400 and System/3X community is an enormous customer base, and IBM is committed to keeping it.

Looking then at the smaller picture, there are several questions that may be on the minds of users. Here are some recent responses from Stephen Schwartz, who heads up the AS/400 business, on issues that concern this group.

Continued on page 30

They aren't speaking . . . yet

Debate over distributed computing heats up as OSF hunts for standard

ANALYSIS

BY AMY CORTESE
CW STAFF

An initiative by the Open Software Foundation (OSF) to adopt a standard Distributed Computing Environment (DCE) has become the focal point of industry activity and the subject of some debate.

At issue is how applications will share resources such as files and computing power over networks of multivendor systems — while appearing to users as a single system.

Although this capability exists within single vendor networks, or multivendor networks using the same protocols, it is becoming increasingly clear that a standard environment for achieving distributed computing is essential if disparate systems are to work together.

Through its Request for Technology program, the OSF is attempting to identify a core set of services that would facilitate the creation and use of distributed applications. These services include remote procedure calls (RPC) and a distributed file system, as well as security and presentation services.

The OSF is evaluating a few technologies narrowed down from over 50 submissions from industry and academia. The two candidates receiving the most attention and considered the most likely candidates are the Decorum offering, provided by a group of vendors including IBM and Hewlett-Packard Co., and technology from Sun Microsystems, Inc., which has built a broad base of support for its Network File System (NFS).

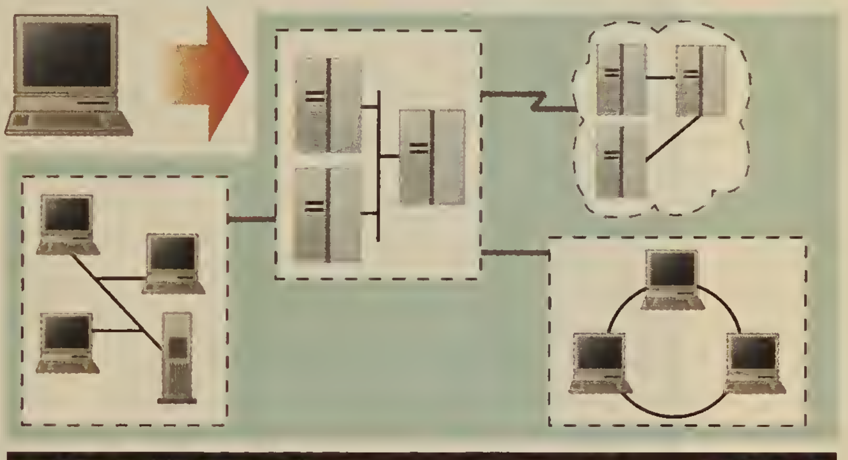
The decision is shaping up to be as politically charged as the OSF's graphical user interface selection.

Decorum is considered by industry observers to be the most comprehensive submission. Various products, including the HP Apollo division's Network Computing System (NCS) RPC technology, a file system from Transarc Corp. and the Transparent Computing Facility from Locus Computing Corp. (developed for IBM), are being integrated to provide a complete environment for distributed computing. However, critics of Decorum contend that some aspects of a DCE are too immature to be standardized on now.

Sun, on the other hand, proposed certain elements of its Open Network Environment. Part of that is NFS, which is currently used by most major vendors, including those in the Decorum group.

A virtual world

The virtual network of a distributed computing environment can give a user a single, logical view of diverse systems



SOURCE: PATRICIA SEYBOLD'S NETWORK MONITOR

CW CHART: JOHN YORK

Some analysts said that Decorum provides a more efficient

Continued on page 38

IBM 9370 user survives battle of misconceptions

BY ROSEMARY HAMILTON
CW STAFF

As an IBM 9370 user, John Santoro, the vice-president of data management at Bio-Pharm Clinical Services, Inc., has been fighting a perception vs. reality battle for nearly two years.

At times he has worried that he has a dead-end system on his hands. But he claims his 9370 Model 60 does a good job for his company. So recently he decided to purchase two more models.

"We've always been concerned of the possibility that it might not be around," Santoro said. "But we've been reassured by IBM that they are committed to the product. As an entry-level 370 machine, it's perfect for companies like us."

The 9370, IBM's low-end mainframe, has long been perceived as a loser. Introduced in late 1986, it was instantly slammed by industry observers, and for good reason. There were few application packages or communications links available for it. Most importantly, it appeared that even IBM did not know where to market it. More than three years later, its image has still not recovered.

In reality, however, the 9370 business is not shabby at all. Based on Computer Intelligence estimates, the low-end mainframe has brought in about $2 billion in sales for IBM in the U.S. alone. And that is just hardware.

The estimate does not include money made from operating system licenses or other software sales. Computer Intelligence based that amount on the average system sale, which is $325,000 and includes the CPU and peripherals, and the total U.S. installed base, which is approximately 6,300 units. The average system's cost of entry is $160,000, while the average high-end hardware cost is $580,000, the firm said.

Bio-Pharm, which provides clinical research services to pharmaceutical and biotechnology companies, made its commitment to the 9370 in mid-1987 and almost from the word go has

Continued on page 38

Inside

- CA gives Cullinet CAS software a much-needed facelift. Page 29.
- Analog breaks tradition with its EIS rollout. Page 30.
- Unisys makes it cheaper to buy into imaging. Page 38.

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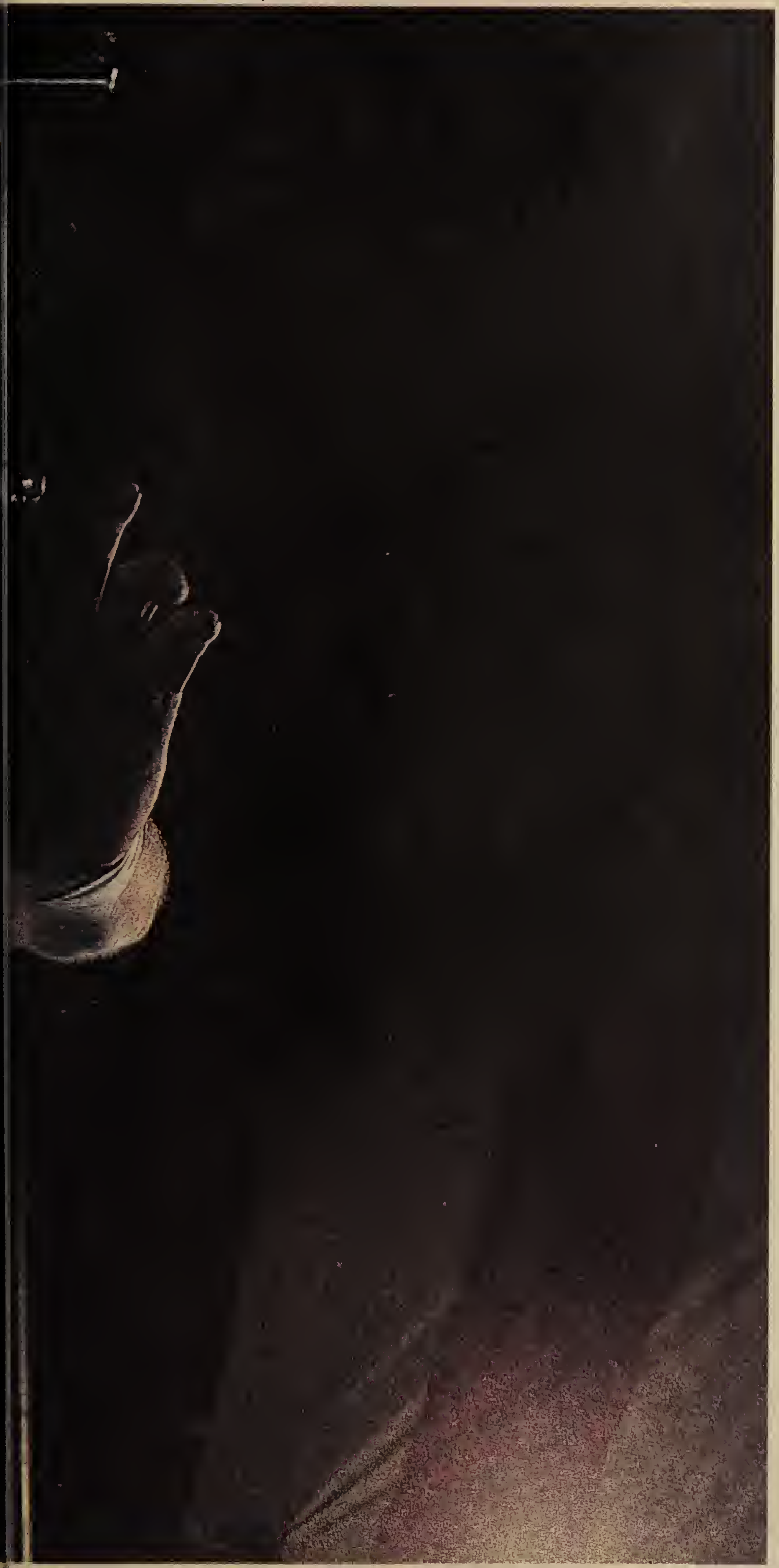

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Fruit shipper picks seasonal solution

ON SITE

BY J. A. SAVAGE
CW STAFF

MEDFORD, Ore. — A delivery is at the front door. Unwrapping the brown paper, you find half a dozen giant pears and apples the size of bowling balls.

The package is from Aunt Hilda via Harry & David, also known as Bear Creek Operations, Inc., which handles up to 100,000 telephone orders such as Aunt Hilda's in a single day during the holiday season.

But Bear Creek, which specializes in sending fruits, nuts and sweets worldwide as gifts, found itself in a dilemma as it looked at how the Christmas rush strained its mainframe.

The company had to decide whether to double the size of its mainframe in order to handle this year's Christmas season — which would leave excess computing power for the bulk of the year — or to find a cheaper, more elastic method of handling seasonal increases.

Management decided to offload the work onto token-ring local-area networks to split up applications and process orders between the existing Hitachi Data Systems Corp. XL/90 mainframe and about 500 personal computers. Hardware and software are expected to cost about $20 million, but Bear Creek expects to recoup some costs by collecting royalties when the systems integrator, Chicago-based TSC, sells the package — TSC's Order Fulfillment System — to retailers.

The decision to split applications between the mainframe and PCs was set in motion when Yamanouchi Holdings bought Bear Creek in May. Darrel Stewart, director of information services, who took over close to the time of the buyout, said Bear Creek muddled through with the old ways during the recent Christmas season, using hordes of seasonal data-entry employees and customer service representatives who had to page through four-foot stacks of reference materials.

Mark Goodman

Bear Creek's Stewart *says system design will handle growth problems*

The new design is based on IBM's DB2 database management system and LU6.2 peer-to-peer communications.

"We're in front of IBM. They weren't prepared to deliver an OS/2 product to support our needs," Stewart said. While waiting for OS/2 Extended Edition, which will supposedly allow a process to run on either a mainframe or PC platform, TSC is writing software to pre-bind processes to DB2. The LAN software could send in a request to interrogate the database, executing certain prebound processes to speed the query.

When OS/2 is able to execute processes on either platform, the TSC software can be replaced with something off the shelf. The software was also designed to adhere to IBM's Systems Application Architecture.

By using LU6.2, either the mainframe or the LAN can initiate sessions. Additionally, it will allow Bear Creek to change the underlying physical vehicle of transmission.

Stewart said that no matter how big the company gets — and it is planning to diversify from fruits and nuts to nonperishable goods — the systems design should solve any growth problems. "Instead of spending millions on CPUs, we put a new ring on the LAN for a couple hundred thousand dollars," he said. Stewart expects to have 20 to 25 16M bit/sec. LANs, each with 30 PCs, by the end of 1990.

As the system is installed, beginning this spring, the company will convert old programs that are "salvageable." For instance, accounts receivable will not be rewritten but will need a new interface.

In addition to salvaging old programs, TSC is writing 700 new programs for the system, said TSC founder Chris Moffitt.

Bear Creek will continue with its mainframe not only for database needs but to handle storage. The company will install IBM's MVS/ESA this year. Stewart anticipates using Enterprise Systems Architecture's System Managed Storage to handle Bear Creek's 90G bytes of data. In the future, LU6.2 and SQL will allow Bear Creek to run an application with no regard to where the data resides.

CA polishes and sends out Cullinet management tools

BY ROBERT MORAN
CW STAFF

Computer Associates International, Inc. recently announced that it has reintroduced enhanced versions of the former Cullinet Software, Inc.'s manufacturing management software after cleaning up documentation and reducing problem counts.

The company announced that its Consolidated Application System (CAS) software was in various stages of availability and that the new versions incorporate numerous just-in-time manufacturing characteristics.

CA-CAS Release 1.3, a set of 14 modules containing manufacturing management and financial management components, was initially released for general availability last summer. Users will receive a maintenance tape by the end of this quarter, the company said.

CA confirmed that the bulk of the enhancements were the work of Cullinet and that CA targeted documentation problems and reduction of problem counts.

Not up to par

According to David Cahn, marketing manager of CA-CAS manufacturing management systems, CAS 1.3 as released by Cullinet lacked documentation and did not meet CA standards.

"CA's standards for documentation, for the resolution of problems and for generally supporting users are tighter than Cullinet's standards," said Dick Siegrist, manufacturing systems consultant at Analog Devices in Norwood, Mass., and chairman of CA-IDMS Application Special Interest Group.

According to Siegrist, who said his comments reflected only his role as user group chairman, CA-CAS Release 1.3 offers productivity improvements.

"CA-CAS 1.3 provides features and functions to accomplish tasks with less work on the part of MIS," he said. "It moves some of the support role of data processing to a user-oriented MIS activity."

CA also announced that CA-CAS/R Release 1.3 is still in beta testing, will be released in an early support program during the first quarter of this year and will become generally available in the third quarter.

While CA-CAS is tailored for job shop- or work order-based processes, CA-CAS/R is very process-oriented, Cahn said.

CAS/R 1.3, which is made up of 14 modules of manufacturing and financial management software, went into beta testing under Cullinet in July 1989 and was held there by CA because it lacked documentation and had a high problem count, Chan said.

Fred Querra, project manager at Hasbro Corp. in Pawtucket, R.I., and a beta-test site user for CA-CAS/R Release 1.2, said the wait for CA-CAS/R Release 1.3 will be worth it. According to Querra, Release 1.3 has been streamlined for on-line transaction processing environments and brings repetitive techniques to the financial management components.

"They [CA] have taken what has been batch-oriented and oriented it toward on-line processing," he said.

The software can be used stand-alone or as a set. Modules cost between $50,000 and $100,000, depending on the size of the processor, and run in IBM MVS, VSE and VM MRP II operating environments.

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THE SYBASE SEMINARS

Analog introduces twist to executive information system

BY ALAN J. RYAN
CW STAFF

NORWOOD, Mass. — Analog Devices, Inc. is getting ready to roll out a traditional executive information system, but its use will be anything but traditional.

For starters, the electronic component manufacturer plans to have as many as 75 users on the EIS by the end of the year — from the top executives to the operating people. The system will contain more data than most companies feel is needed on an EIS, and the information will not be limited to financial measurements.

Analog has shifted its EIS focus because the business world is changing, said Art Schneiderman, vice-president of quality and productivity improvement.

"If you said nonfinancial performance data is a leading indicator of future financial performance, that is probably not far off," he said.

Schneiderman said Japanese companies, for instance, look at quality and productivity as a way to improve the bottom line. "If you get improved product reliability, lead times, responsiveness to customers and better performance, then the financial performance will follow," he said.

The rollout has taken more than a year because Analog's developers are still making decisions on which types of nonfinancial data should be included and how the EIS should be structured for use at a variety of job levels, Schneiderman said.

Analog selected Pilot Executive Software's Command Center EIS. The Pilot mainframe-based system is being used to phase out a proprietary financial-based system that was "user-unfriendly," Schneiderman said.

"It was developed by programmers rather than users." The system ran on an IBM mainframe and used IBM's GDDM color graphics.

However, because Analog is an international company with half of its business located outside the U.S., it was impossible for the foreign-based workers to access the system. "Half of the people in the company couldn't get a graphical connection to the old EIS," Schneiderman said.

The search for a replacement began in late 1988. Because of the type of data involved, Schneiderman said his team realized it was "beginning to violate some of the traditional assumptions about EIS," including the assumption that there would be a limited number of graphical data elements that would be viewed over time. "We found that the views of the data people wanted to see would become more and more flexible," he said.

One concern, Schneiderman said, was that an EIS might not fit the bill for what Analog wanted the system to do. "But then we asked ourselves, 'What limits the EIS to just executives, besides the name?' " he said.

New days, new ways

"Analog says it needs an information system geared toward the objectives of a well-run company and not to the objectives of a financial system that grew up in a different era 50 to 100 years ago," said David Friend, chairman and chief executive officer of Pilot. That old system in many cases is a secondary or tertiary effect on how well the business runs, he added.

The old EIS and Command Center have been running in tandem at Analog while the old system is being phased out, Schneiderman said. "We felt it was not prudent to roll out the new system until it had in it information that was not available elsewhere."

That brought about a long decision-making process.

"One of the challenges is deciding what information people should be looking at, then figuring out a way to deliver it," Schneiderman said. "Five years ago, if you asked executives what data was important, they said 80% was financial and 20% was nonfinancial. Now, it is just the opposite."

Hamilton

CONTINUED FROM PAGE 25

First and foremost, Schwartz flat out dismissed a report, which surfaced at the end of 1988, that suggested IBM will sell off the AS/400 business. Schwartz thinks this notion is laughable and says it "makes absolutely no sense to IBM."

Schwartz tackled a second troubling rumor. This concerns the soon-to-be-released IBM Unix offering commonly called RIOS. Published reports have indicated that it will steal IBM's attention in its midrange pursuits. One report said IBM is now training its AS/400 sales force to sell RIOS boxes.

For the AS/400 user, that could spell bad news. But Schwartz insisted that IBM will be selling the boxes into different markets. Further, he said that the story about RIOS sales training is misleading. IBM does not have a dedicated AS/400 sales force. It would be standard procedure for the general sales force to be taught about a new system, he adds. That does not indicate a lessened commitment to AS/400s, he maintains.

On product enhancements, Schwartz says IBM is still committed to introducing a multiprocessor version of the AS/400, which is good news for shops hoping to expand with this product line. The bad news is that Schwartz is being coy about the system's availability.

However, he's much straighter when it comes to the low end of the line. There should be some new models coming, perhaps as soon as this month. When he was asked about this last month, he said: "Last year we enhanced the high end and midrange. It is logical to assume that we'll enhance the low end as well. We will do that in the early part of this year."

According to industry observers, we'll see lower priced versions of the existing low end, which is very good news. Low-end models are too pricey for what they actually give users, and it's about time IBM corrects that.

Hamilton is *Computerworld's* senior editor, systems.

Client/Server Architecture What is it? And what are its benefits?

Two weeks from today, Sybase will publish its views on this critical issue. We have invited Oracle to join us, and have reserved the right hand column for their comments.

The Sybase View

The Oracle View

(The Sybase invitation to Oracle, sent by registered mail, covered the following points in detail. One: manuscripts must be limited to 500 words or less. Two: manuscripts from both parties must be submitted to the San Francisco office of the accounting firm of Ernst & Young by 5 PM, Tuesday, February 6, 1990. Three: Ernst & Young will ensure that manuscripts are published in full, and exactly as submitted. Four: no revisions will be allowed, and neither party will be permitted to see the other's comments prior to submitting its own manuscript.)

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No 'Integral' plans unleashed as yet

Integral and Data Design's slow merge has little effect on its users

BY AMY CORTESE
CW STAFF

More than four months after the merger of Integral Systems, Inc. and Data Design Associates, the company — now called Integral — has yet to disclose to customers its plans for integrating the two product lines. But for many customers, that is OK, since they say they are not likely to change what they are doing anyway.

The merger last August brought together Data Design's accounting applications and Integral Systems' personnel software. Integral officials, contrasting their merger with that of Management Science America, Inc. and McCormack & Dodge Corp., noted the synergy between the firms' product lines for IBM mainframe and midrange platforms. In most firms, accounting packages, like general ledger, need to exchange information with personnel systems such as payroll or benefits.

Indeed, many vendors have noted the advantages of integrated applications, as reflected by the wave of acquisitions and strategic alliances in that area over the past several months. But despite these efforts to team up, users do not appear ready to budge from their current "back office" systems without very good reason. Most have already built the bridges to allow applications from different vendors to share information.

While some Integral customers contacted recently said they were waiting for specific product plans, many said it would not matter, since they are not likely to switch from their current software packages.

Bill Brown, director of MIS at Hinsdale Hospital in Hinsdale, Ill., said that interfaces between applications such as general ledger and payroll are essential, especially in industries like health care in which the systems are large and the staffs small. "You have to get the right information into the general ledger," Brown said, and built-in links between accounting and personnel applications facilitate that.

> MANY VENDORS HAVE noted the advantages of integrated applications.

However, Brown had to build custom interfaces between the mix of Integral, Walker Interactive and M&D applications running on his IBM mainframe. Integrated applications are "an advantage if you're making a change," Brown said. But like many customers, Brown is not eager to make a change. In applications software, the "if it's not broken, don't fix it" rule usually applies, he said. "When you make that kind of commitment" to an application package, he maintained, "it's usually a long-term one."

Nonetheless, users see other benefits of the Integral merger. James Alexander, director of corporate systems at S&A Restaurant Corp. in Dallas, uses both Integral's payroll and Data Design's fixed assets software. While he said he has heard nothing of the company's plans, he is hoping to negotiate a better maintenance deal since both are now owned by the same vendor.

Integral is making IBM's Systems Application Architecture top priority, bringing Data Design accounting software to the DB2 environment, the firm said. When it comes to integrating applications, "relational DBMS gives you a whole lot of options," said Robin Trenbreath, data processing director at Pierce County in Tacoma, Wash.

While Integral said it has combined the sales force and technical staff, customers have noted no changes in support or service as a result of the merger.

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Unisys adds V series systems

BY ROBERT MORAN
CW STAFF

Unisys Corp. has lowered the price of entry to both the V Series mainframes and the imaging systems in which those mainframes can play a role.

The company recently announced two scaled-down V Series mainframes — the V410 and V430 — that are object code-compatible with the V300 and V500 and older Burroughs Corp. mainframes.

V430 beta-test site user Dave Johnston, vice-president and MIS director at Heritage Federal Savings Bank in Taylor, Mich., has had the system since October and uses it for applications such as general ledger. The V430 replaced a Burroughs B2930 mainframe; the bank retained its B3995. "Our biggest problem was getting work done," Johnston said. "Quarterly reconciliations that took about 24 hours on both machines now take seven hours on the V430."

But Unisys is also touting the processors for check image processing as an entry point $300,000 to $500,000 lower than the previous $2.5 million price tag.

In the Unisys check processing strategy, the mainframe is surrounded by reader/sorters and cameras for recording images of checks, which are sent to servers. Those servers are connected by local-area networks to the mainframe, enabling the operator to access data from the mainframe and images from servers.

George Lindamood, director of industry services at Gartner Group, Inc. in Stamford, Conn., said, "By lowering the entry price point, Unisys seems to be positioning its imaging systems at the next tier banks and is avoiding taking on the giant [IBM] toe to toe at the high end."

Deliveries for the V430 are scheduled to begin in March with prices starting at $258,000.

9370 users

CONTINUED FROM PAGE 25

been concerned that IBM would terminate the product line.

Santoro said Bio-Pharm considered other vendors but decided the 9370 offered better performance for data management and statistical applications that make up the bulk of Bio-Pharm's work. The choice was narrowed down to the 9370 or Digital Equipment Corp. VAX 8350. Santoro said on most key points, such as price, the two were equal. But the 9370 beat the VAX on throughput.

Since then, the 9370 has held its own while IBM has worked hard to convince Santoro that the 9370 is not a loser. Late last year, IBM flew Santoro to Endicott, N.Y., to meet with 9370 developers, who reassured him of the system's future.

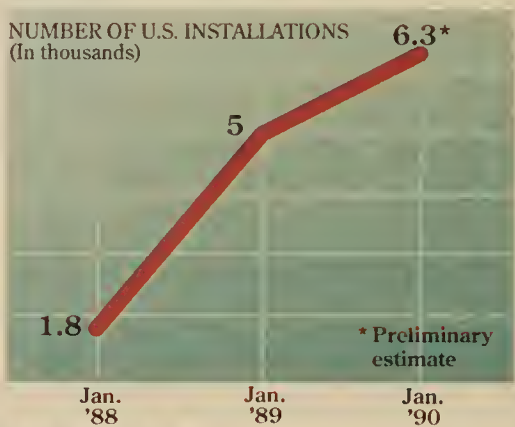
"As the first purchase of a major piece of hardware, you voice concerns from the day you purchase it," he said. "But you become more concerned when you read the negative press. They have been very responsive."

Santoro said the current 9370 supports 30 to 40 users and is dedicated almost entirely to the outside service work Bio-Pharm provides. The company runs statistical analysis programs and compiles research for its clients, who then submit reports — usually new drug applications — to the Food and Drug Administration.

Santoro said he will upgrade the Model 60 to a Model 90 later this year. He also plans to pick up a smaller Model 30, which will handle the data entry portion of the analysis jobs.

Still gaining

Even if it has fallen short of IBM's original goals, the 9370 has made its way into a growing number of sites



SOURCE: COMPUTER INTELLIGENCE
CW CHART: JOHN YORK

Debate

CONTINUED FROM PAGE 25

implementation of a DCE, including a more object-oriented approach and greater scalability, while claiming compatibility with Sun's NFS. However, the OSF does not rule out a mix of technologies from two or more submissions, as happened with the Motif graphical user interface. Decorum members have said that they will support OSF's final decision, whatever the outcome.

The OSF effort could go a long way in firming up this vision of transparent distributed processing. "The OSF decision will help things immensely, if only in pairing down the choices," said Michael Miliken, vice-president at Patricia Seybold's Office Computing Group. Although a decision is not expected until April, the OSF's work has already contributed a technology model to help better understand the various components needed to enable true distributed processing across disparate systems.

The DCE lays the foundation for other important technologies, such as distributed transaction processing. Although this work has grown out of the Unix world, it is intended to go beyond Unix systems to provide an architecture for communicating among many types of systems, including OS/2 and proprietary operating environments.

While vendors seek to solve the problems of distributed computing, some leading-edge companies are forging ahead on their own. At The Putnam Companies in Boston, information needed by the investment management firm is supplied by many data sources, including relational, real-time and historical databases. "We would like to write applications that pull data from any one or all of them," said Putnam Vice-President Steven Levi. Levi added that instead of simply pulling the data, distributed computing should let the machine containing the relevant data do the processing.

Many conventions

Putnam uses both Apollo's NCS and Sun's NFS in developing its distributed applications, but applications must specify which conventions they are using.

Most distributed processing development work is now done in-house, and there are very few off-the-shelf distributed applications. For instance, Levi said he would not be able to buy a packaged portfolio optimization application that runs over a network. But once the industry has consolidated on one method, Levi predicted that software vendors would develop more distributed applications.

A standard DCE will not be a panacea, however. A new model of computing will require new software tools and new ways of developing distributed applications. The issues and concerns of homogeneous networks will be magnified in a distributed heterogeneous environment, and tools to monitor and manage those networks will be critical.

NEW PRODUCTS — SOFTWARE

Software applications packages

Minitab, Inc. has enhanced its statistical software package to run on more than a dozen AT&T Unix System V-based systems.

Version 7.1 operates on Unix-based platforms from Digital Equipment Corp., Hewlett-Packard Co. and Sun Microsystems, Inc., as well as those from Harris Corp., NCR Corp., Unisys Corp. and others. Statistical applications developed with the package may be moved across Unix, DOS and VMS operating environments without modification, and additional functions include statistical process control and general linear modeling.

The upgraded version is available free to licensed users, and license fees range from $1,300 to $4,900 per year, depending on machine configuration.

Minitab
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State College, Pa. 16801
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Utilities

Information Dimensions, Inc. has announced support for Digital Equipment Corp.'s image processing and product strategy, including the Decimage Application Services.

As a DEC Cooperative Marketing Program partner, Information Dimensions will support the DEC image subsystems via the Basisplus Text Information Management System. The software package complies with DEC's Compound Document Architecture and Digital Document Interchange Format for managing text graphics and images.

First-copy license fees for Basisplus range from $5,000 to $160,000, depending on CPU size and number of users.

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Computer Information Systems, Inc. has announced Version 2.0 of Roboman, the company's automatic monitor software product for Digital Equipment Corp.'s VAX/VMS environment.

The latest release offers queue, job and file monitoring and can monitor 400 additional statistical functions. The product also monitors files for size, fragmentation and usage.

Prices range from $750 to $20,000.

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H&W Computer Systems, Inc. has announced SYSI, a TSO interface to VTAM applications designed to give TSO users full and direct access to CICS-based products.

The program provides a "hot-key" type of process for TSO users who do not have access to a software or hardware session manager. The interface also features an automated facility that allows recording and replay of the interactions used to log on to and communicate with CICS applications.

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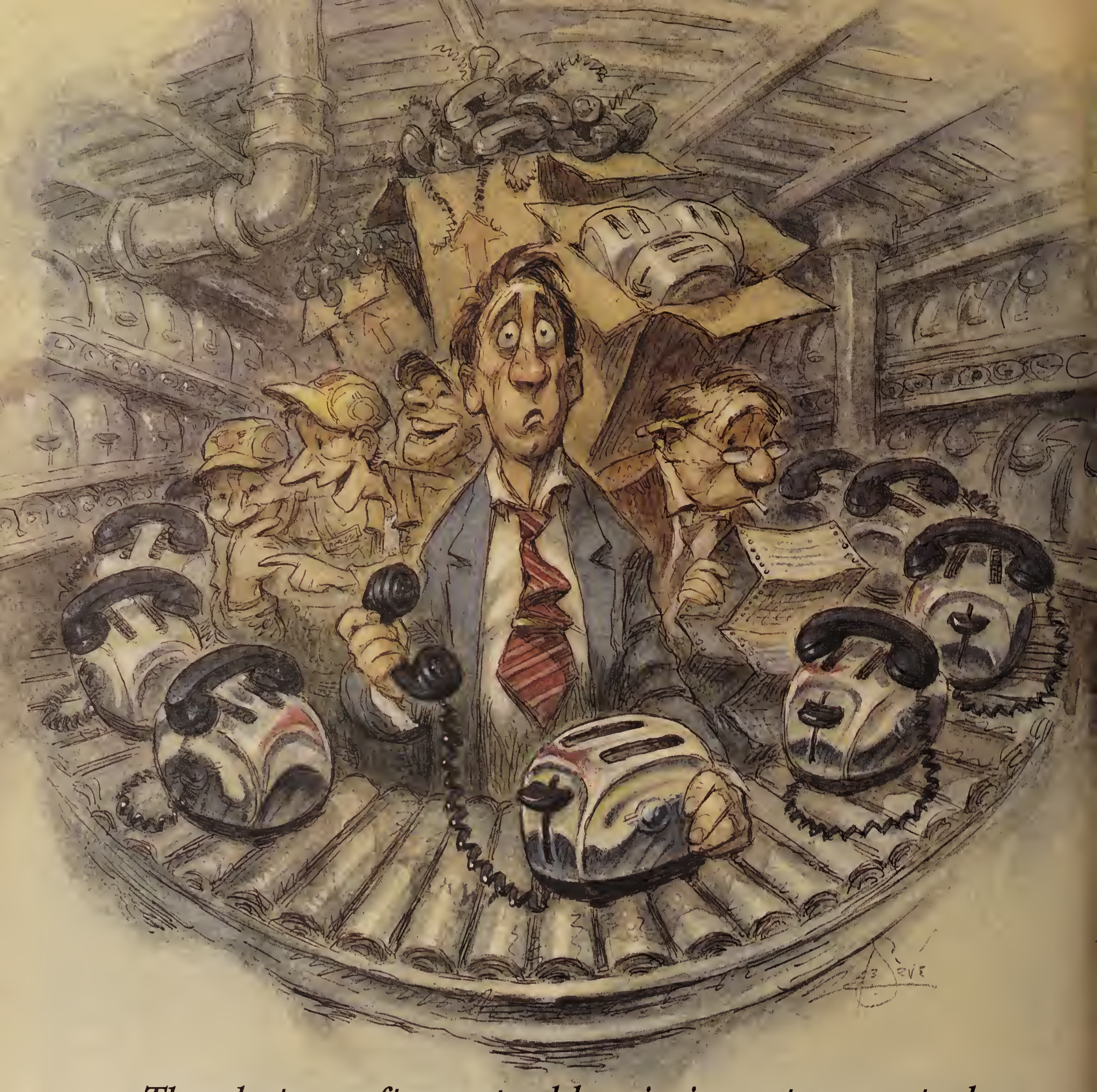

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INTRODUCTION

EVOLUTION OF ISDN
- History of ISDN
- Why ISDN?

DEFINITIONS
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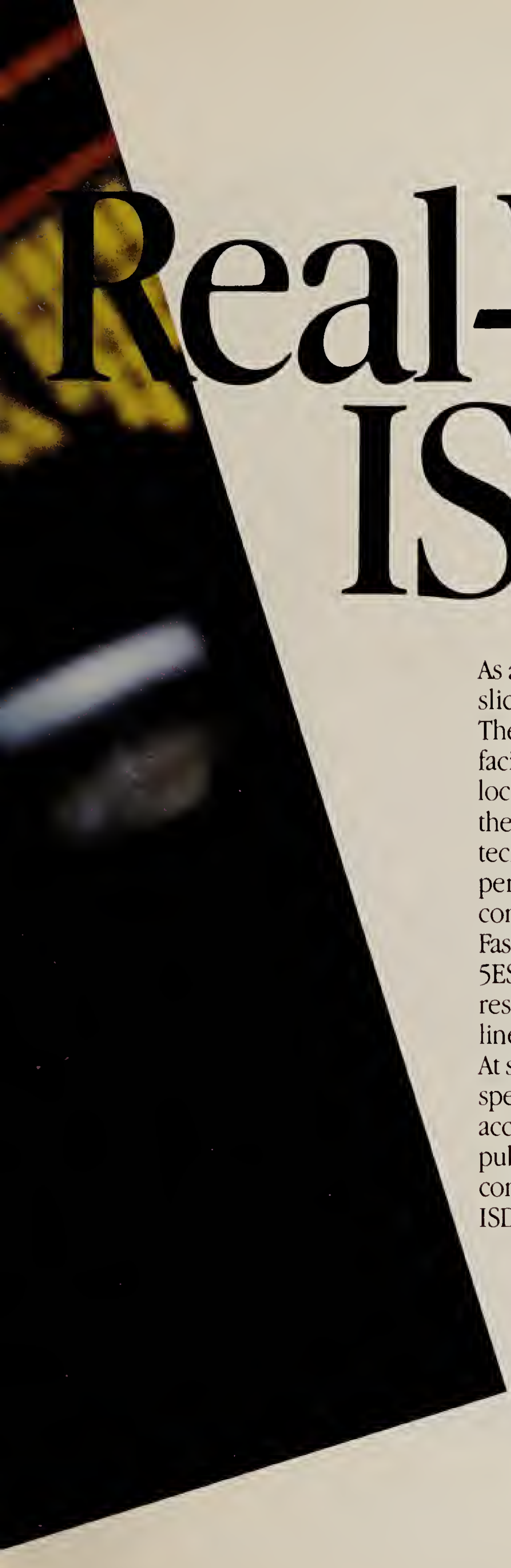

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THE INTERNATIONAL TELECOMMUNICATIONS UNION (ITU), DEFINED ISDN IN 1981 AS: "A NETWORK EVOLVED FROM THE TELEPHONY INTEGRATED DIGITAL NETWORK THAT PROVIDES END-TO-END CONNECTIVITY TO SUPPORT A WIDE RANGE OF SERVICES, INCLUDING VOICE AND NON-VOICE SERVICES, TO WHICH USERS HAVE ACCESS BY A LIMITED SET OF STANDARD MULTIPURPOSE CUSTOMER INTERFACES." ■ THE BENEFITS OF ISDN ARE DELIVERED TO THREE DISTINCT GROUPS. THE TELECOMMUNICATIONS COMPANIES OF THE WORLD (I.E., THE PHONE COMPANIES) BENEFIT BY IMPLEMENTING MORE COST-EFFECTIVE TECHNOLOGY, BROADENING THEIR USER BASE, AND ENHANCING THEIR SERVICE OFFERINGS.

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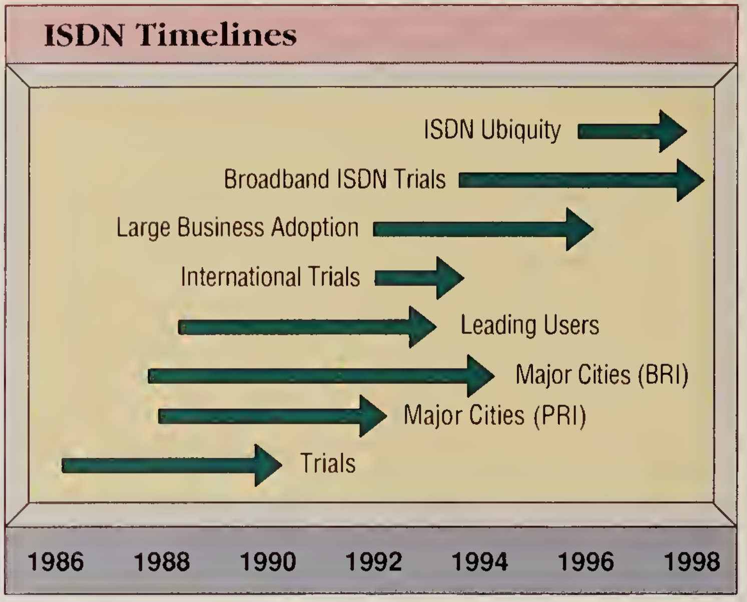
The following research paper is meant to provide a general overview and status report of the progress of ISDN. It is not meant to be a technical journal, nor is it composed of ISDN hype. Instead, it paints a realistic, yet hopeful, picture of the next big step in the evolution of the public and private networks around the world.


ISDN Timelines

EVOLUTION OF ISDN

History of ISDN. ISDN as a technology standard has its roots back in the late 70s. It was at this time that AT&T set about the business of integrating different information streams, building toward distributed processing, and redesigning and reimplementing its mostly analog network into a totally digital transmission scheme.

In 1980, while AT&T was preparing for the inevitably more demanding customer base, the worldwide telephony community formed under the banner of CCITT to establish a set of standards for a universal Integrated Services Digital Network. ISDN was born. AT&T in the post-divestiture world let go of the defacto standards setting activity for this country and it was promptly reformed under ANSI and its T1D1 organization.

The standards setting activities were mostly completed in the early to mid-80s with trials starting up in 1986. Needless to say, the progress has been slow, and as a result, many of the initial reasons for an ISDN, such as digital transmission, high-speed end user connectivity, and distributed processing, have been supplanted by other technologies such as local area networks, fiber transmission facilities, private T-1 networks, and high-performance workstations. This is not to say that ISDN has no place in the world as we know it today. It definitely does. If the reason for all networks is timely information access, then ISDN in many ways represents the networking alternative with the broadest potential reach. It may not be the fastest, or the most feature-rich, but it represents the most all-encompassing network of the future.

Why ISDN? ISDN was designed to provide a worldwide mechanism for delivering standardized telecommunications services not just among the world's telephone companies, but also among the world's end-users. The telephone companies of the world are not usually accused of being far-sighted, but they readily accepted that the world was increasingly asking for more than just voice-oriented analog switching. This multibillion dollar business, although a huge revenue generator, exists within a fairly flat and increasingly competitive market.

Salvation for the telephone companies comes in the form of digital transmission services, the management and movement of voice, data, and video information, and highly profitable value-added services, such as advanced call handling capabilities, mail delivery, videotex, and public data base access. Remember, in the late 70s, the computer and software companies of the world were reaping the benefits of servicing the information-intense environment that would no doubt be present the rest of this century and beyond. The telephone companies wanted a piece of this action. And given the size of most phone companies, only a large piece would be adequate. This could only be accomplished by implementing a large and very powerful network which could then be leveraged into the workplaces and hearts of governments, commercial entities, and end-users of the entire world. Granted it was an aggressive plan, but a boundless profit potential was riding on ISDN's future success. And since the phone companies form the core of ISDN transport and services, those phone companies that implement the most effective, efficient, and timely ISDN capabilities are guaranteed a large return over the next five, 10, and 20 years. This is especially true in today's increasingly standardized and deregulated telecommunications industry.

DEFINITIONS

The ISDN Network Node. Because of the breadth of service ISDN provides, a node could be just about any type of information processing device. PBXs, computers, PCs, workstations, video codecs, terminals, telephone handsets, fax machines, and central

Southwestern Bell is sharing, not secluding ISDN technology

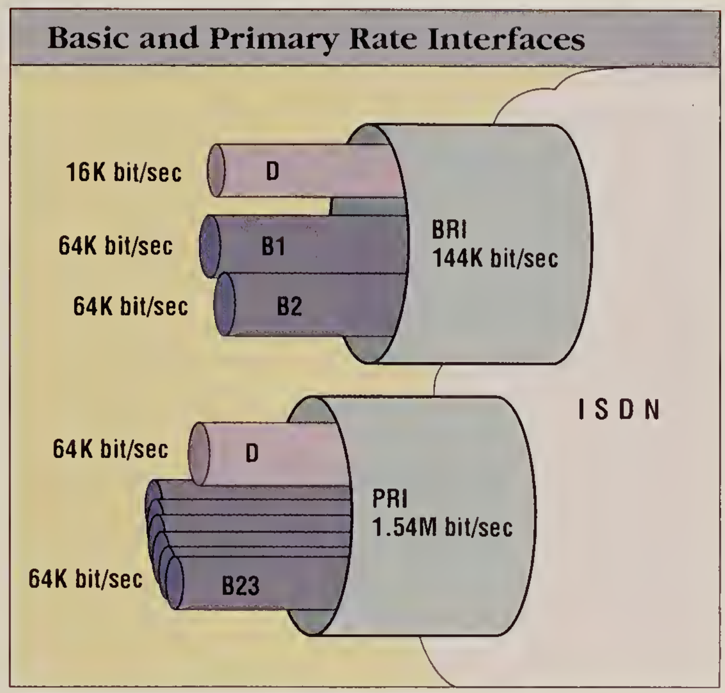
Somehow, this seems too good to be true. In a world where the fruits of technology development are typically guarded like proprietary treasure, Southwestern Bell's Advanced Technology Laboratory here has brought users and vendors together in an environment where the latest technology is shared, not secluded.

Although the central focus of the lab is Integrated Services Digital Network (ISDN), it plays host to an array of additional technologies that are tested under conditions that don't threaten live service offerings. Everything from videotex to fiber optic multiplexers to remote file sharing is under investigation. And the charge for access to the Advanced Technology lab is zero, nothing.

The price must be right. Since the lab opened in mid-1987, a throng of users and vendors from around the world have come to test and develop products in a real world environment they wouldn't otherwise have access to. Users have the opportunity to put their hands on complex, expensive equipment before they make any big dollar commitments to altering their networks. Vendors can test their equipment against central office switches and computers from a variety of other vendors.

office switches are all candidates. The key to ISDN in the near future is making all these devices work together in a coherent and worthwhile fashion.

Here, ISDN's role as integrator of disparate systems, not enabler of new services, is one that is sometimes lost in the glamour and hype surrounding this new worldwide technology. It is this systems integrator role that has attracted most early paying customers to ISDN.


Basic and Primary Rate Interfaces

Basic vs. Primary Rate Interface. Basic Rate Interface (BRI) defines three separate channels for use by the subscriber. These channels combine over one physical connection to provide a 144K bit/sec pipe into the ISDN. This pipe is divided into two 64K bit/sec B channels, either of which may be used for voice or data by the end-user, and one 16K bit/sec D channel to be utilized for packetized data and/or control information (i.e., call set-up and shutdown). The BRI is meant to provide ISDN access via end-user devices such as terminals, PCs, telephone handsets, and faxes. The BRI, with its standardized access, will provide for the direct connection of most end users into ISDN. Only those user devices within high-speed LAN environments will be more likely to skip BRI and proceed into ISDN through a Primary Rate Interface (PRI) gateway system. Given that most end user devices (business and consumer) are not operating over megabit LANs, BRI will be the user interface of choice for at least the next five-to-10 years.

PRI specificies 23 64K bit/sec B channels and one 64K bit/sec D channel for use by the subscriber. In all, a total of 1.54M bit/sec is available within the PRI. The PRI is intended to provide bulk connectivity into the network from the computers, PBXs, LANs and high-end multiplexers, on a customer's premises. Although resembling a standard DS-1 (or T-1) circuit in bandwidth, the PRI, with its D channel attached, has much more potential in terms of flexibility, efficiency, and value-added delivery.

Terminal Interface Types. Basically, there are two kinds of terminal equipment: those devices that have built-in ISDN interface and signalling compatibility, and those devices which access ISDN through a converter device. Terminal Endpoint Type 1 (TE1) devices, such as an ISDN integrated voice data personal computer or ISDN video codec, are able to be directly connected into the ISDN. Terminal Endpoint Type 2 (TE2) devices support non-ISDN interfaces such as RS-232, V.24, Ethernet, and Token Ring, and require a BRI Terminal Adapter (TA) between them and the ISDN. A TA is a customer-owned and managed conversion unit that provides ISDN BRI access for devices with no such capabilities.

The BRI Terminal Adapter within an ISDN environment functions like the modem in today's analog environment. It will provide the connectivity for non-ISDN end-user devices such as terminals, PCs, workstations, telephone handsets, and fax machines.

Information Streams. As stated previously, the channel types are B and D. The B channel is a 64K bit/sec pipe for user information. That information can be data, voice, or video — or for that matter, anything else that technology provides in the future. Since the most aggressive ISDN service and equipment suppliers come from the voice-oriented world (e.g., telephone companies, PBX and central office switch vendors), the first wave of ISDN utilization will be in the voice-into-data market. This is where voice-initiated dialogues are blended with a computer-data component. The earliest applications for ISDN involve a voice call initiating data processing which results in a coordinated voice and data processing session for a telemarketing service representative.

This is not to say that the data-only side is being ignored. It is not. There are many people who require high-speed access across wide area networks. LAN-to-LAN connectivity is one scenario. Tying campus environment users into a multi-processor environment is another. And certainly, any T-1 (for data or voice/data) subscriber is a third. These applications are less exciting, but nonetheless real. They are also growing in volume, expanding in complexity, and broadening geographically at a significantly faster rate than voice traffic.

Out-of-Band Signalling. The concept of out-of-band signalling comes to us from sideband radio technology. The sideband technique has been utilized within certain portions of the world's phone network for many years. Its use within the entire phone system is very new and revolutionary.

At the heart of out-of-band signalling within ISDN is the D channel. The D channel is the control pipe for both PRI and BRI links. It is designed to carry control information that is related to, but not necessarily part of, the user information that will be contained in the B channels. The information streams that may travel the BRI and PRI D channels need not be unique to each of the two interfaces. The main difference will be in volume, with the PRI D channel needing to service 23 B channels, and the BRI D channel supporting just two. Appropriately, the D channel for BRI is rated at 16K bit/sec while the PRI's D channel specifies 64K bit/sec.

The reason this is so important is best explained through example. Network management is one of the most crucial applications that must operate within a network. However, the more robust and proactive a network management system becomes, the more of the network's bandwidth and processing power it takes up. Given this increase in load, a network management system's principal concern may very well be its own use of the network, a situation that neither a network nor financial manager wants to see. It could also be said that a network management system cannot manage effectively while actually being part of the network. After all, if the network goes down, the network management system is literally turned off, offering no help in any restoral of service procedure.

Out-of-band signalling also serves as the primary platform for many of the enhanced services provided through ISDN. Call set-up, when performed out-of-band, as opposed to today's in-band style, reduces set-up time from 20 seconds to about three seconds. This is the direct result of control overhead being minimized. Literally overnight, by making use of out-of-band signalling techniques, common carriers can free up transmission capacity. Although this is very significant for call set-up today, when we examine the pre-processing of information that will need to be performed for future telephony applications, this reduction in overhead becomes extremely significant.

Broadband ISDN. Broadband ISDN (BISDN) is meant to build upon ISDN's functionality by taking advantage of the widespread availability of fiber optic technology. With lower error rates and much greater bandwidth potential, fiber optic transmission schemes allow BISDN specifications to reduce error checking overhead and increase information transfer rates to 150M bit/sec. Also of note is the fact that the Synchronous Optical Network (SONET) standards are being adopted for use within BISDN. SONET, initially a Bell Communications Research concept, calls for a more coordinated approach to fiber optic usage and is designed to provide speeds between 50M bit/sec and 13G bit/sec. SONET's inclusion in BISDN specifications bodes well for ISDN's capability to eventually overcome its current bandwidth limitations.

ISDN User Profile

CSX Corporation

The fifth largest U.S. transport company

Task at Hand

Centralizing control of its national railroad operations at a 90-person command center in Jackson, Fla.

Solution

ISDN Primary Rate Interface call-by-call service selection feature

Result

Five, not seven, T-1 access lines are required to support the center's inbound and outbound calls

Savings

$30,000 annually

CURRENT STATUS

The United States. The much-publicized ISDN trials of the last couple of years have enjoyed various levels of success. Unlike past trials of new and untested products, these beta sites were not necessarily trying to weed out the bugs in the technology making up the ISDN components. After all, the technology of ISDN transmission is made up of relatively simple and available mechanisms. Digital transmission is very widespread. Digital Customer Premise Equipment (CPE) is even more widespread. PRI is essentially a DS-1 (or T-1) service. BRI is just a multiplexed line supporting two 64K bit/sec circuits and one 16K bit/sec circuit. Instead, most of the beta efforts have gone toward making the components and services work together in a coordinated and reliable fashion.

So why the expense and trouble of all these trials? Because to the end user, the value in ISDN is in the applications (i.e., end-user services) it offers, delivers, and returns revenue on. The trials are intended to point the way to the promised application or applications. Given the success of IBM's Systems Network Architecture (SNA) because of transaction processing, and PC LANs because of peripheral sharing and peer communications, the proponents of ISDN view application success as driving ISDN success. They are quite right in this estimation.

ISDN (or ISDN services) are just now rolling out into the paying end user community on a tariffed basis. AT&T received approval for its tariffed offerings in the Summer of 1988 after filing for them the previous Spring. By the end of 1989, AT&T planned to make its ISDN PRI service available in 73 cities. By the end of 1990, a total of 290 AT&T central offices will offer ISDN PRI services. Ameritech, through Illinois Bell, was able to offer ISDN services at the same time as AT&T. Pacific Bell and Southwestern Bell have also filed tariffs for services within the past few months.

The European Economic Community. Europe and its Postal Telephone & Telegraphs (PTT) are considered to be a year or so ahead in deployment. This varies from country to country in Europe. France has ISDN capability in approximately 75% of its central office switches, while Germany is only about 40% ISDN-ready. Where ISDN is ahead in Europe specifically relates to services for the end-user. Competition within the European Economic Community is intensifying as a result of the 1992 decree. This near-future political, economic, and technological openness of European industry has driven the PTTs toward ISDN at a faster pace than their U.S. counterparts (i.e., the Interexchange Carriers [IXCs], Regional Bell Operating Companies [RBOCs], Bell Operating Companies [BOCs], and Other Common Carriers [OCCs]). The PTTs, by implementing ISDN faster and offering more robust services, protect themselves in the upcoming competitive environment of 1992 and beyond. It also positions them better for international and intra-EEC competition in this same timeframe.

Although the Europeans are viewed as further along the curve of ISDN services, it is believed that the more advanced U.S.-based ISDN service providers will equal and, in some cases, surpass their European counterparts within the next couple of years. With the crumbling of regulatory barriers pertaining to where and what telecomm services any particular company can provide, and the driving forces within the commercial world pertaining to where, how, and to whom products and services must be offered, ISDN in the U.S. is just now showing signs of gaining momentum. International Data Corporation (IDC) believes that the growth of ISDN access lines will build from the approximately 200,000 lines installed today to three-quarters of a billion in the year 1995.

SPECIFIC CAPABILITIES AND RESULTING BENEFITS

The ideals of ISDN sound simple. Unfortunately, the implementation of these ideals is complex. The complexities come from the different interpretations of these so-called standard interface definitions and the fuzzy nature of the wide-ranging services. The reality of today's ISDN benefits the user by simplifying the connection to the network and by providing better performance through that connection. The capabilities that are promised through enhanced services and functionality are embryonic and won't be fully realized for some time to come. The leading edge users are just now scratching the surface and are spending a lot of time, energy and money doing so.

End-to-End Digital. Converting our wide area networks to digital provides us with two distinct advantages over the older analog configurations that have been in use since the Bell system was first formed. The first is certainly a reduction in error rates. Digital technology and improvement in media account for error rates in the order of one in one billion bits. By comparison, LANs can push rates as high as one in one trillion. The second is performance. Without digital technology, rates of 64K bit/sec and above are simply out of reach. If one is to prepare for the exponentially higher bandwidth needs of future information systems (e.g., LAN-like wide area network access is already in great demand by many larger corporations), then end-to-end digital is a must.

Although easily overlooked, but very much an influencing factor here, is the fact that all end nodes are digital (or at least are becoming digital). PBXs, computers, PCs, and fax machines, are all based on digital technology. The ease of placing a digital user device on a digital network should not be overlooked in this worldwide network conversion.

Integrated Access. The long awaited integration of voice and data culminates in ISDN. Up to now, the voice world and the data world were only brought together within a transmission scheme. At best, they would share multiplexing equipment. At times, they would share wiring and circuits. Most of the time however, voice and data would go their separate ways. The processing and information contained within each type of stream still remain very much separated. ISDN is pushing at both ends, driving each of these types of information closer together. Not just by making voice digital and simply putting data through a voice PBX, but rather by causing data and voice to be processed and linked together within a logical system.

Right now, voice call pre- and post-processing represents the most innovative technology within ISDN. The reduction in call set-up time from 20 seconds to three seconds via out-of-band signalling techniques is the most readily apparent benefit of ISDN. Shutdown has also been reduced similarly. These reductions allow not only for reduced overhead in switches and facilities, but also enable the provision of enhanced services like Call-by-Call service, which allows the on-demand allocation of bandwidth for changing needs, and Automatic Number Identification (ANI), which provides information about a calling party to the called party.

ANI allows voice-oriented information (i.e., caller's telephone number) to prompt processing activity within the data center, making both voice and data streams appear before a telemarketing or customer service agent simultaneously, with the voice stream being delivered via a ringing phone and the data stream being delivered via a formatted display screen. The obvious flaw in ANI is that you must call from a known telephone. For example, if you call from home, that's great. If you call from a pay phone in East Oshkosh, Wisconsin, ANI is defeated.

There is also the benefit of integrated access from the perspective of information accessibility. In many ways, by aligning the world's telecommunications networks into one ISDN, services for end-users would become truly universal. No longer would one have to be connected to the right network to gain access to the right information. Now granted, this is the ideal, but it is an intended goal for ISDN. And since ISDN is the most globally influential and potentially pervasive networking technology, it is the logical choice for providing this all-encompassing end-user information access.

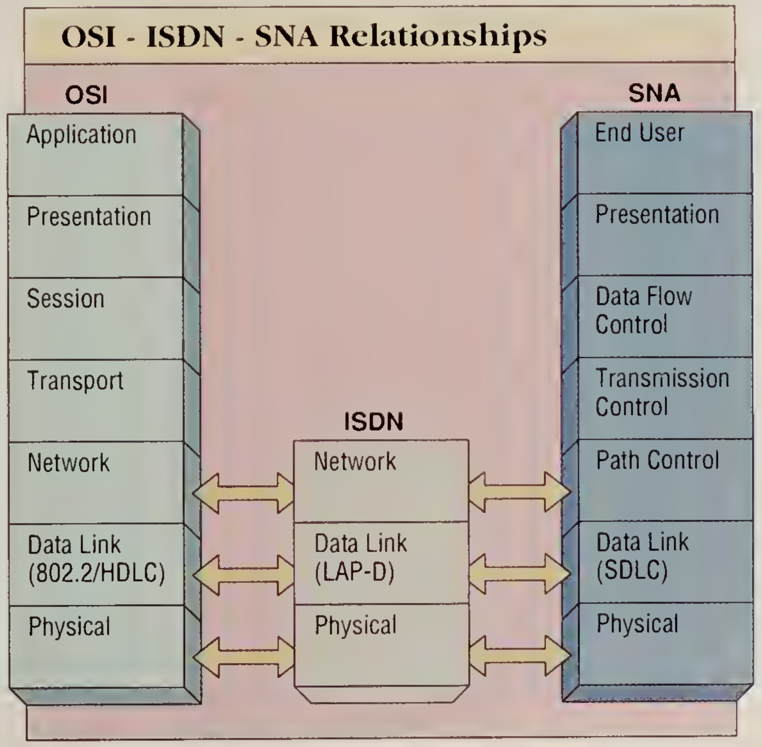
High-Speed Information Transfer. From the outset, ISDN was designed to provide high speed service to the user's desktop. Speed, however, is relative. The 64K bit/sec delivered by ISDN is far faster than what many users had in the past, but far slower than today's 4M and 10M bit/sec LANs.

Fortunately for ISDN, however, most business users are not connected to megabit LANs and home users with their 1,200 and 2,400 bit/sec modems, will benefit greatly from 64K bit/sec. Some examples of others who would benefit are remote sales offices, data entry pools, help desks, and telecommuters. We use the term remote here, rather than distributed, because these locations would be dependent on a remote processor for information. In many ways, ISDN can be labelled for the time being as the poor man's technology, serving best those people who had neither the money nor the internal fortitude for upgrading their local area and wide area networking systems in the 80s. ISDN is, in effect, the technology that allows the trailing edge to play catch up. This is not to say that ISDN is not for the leading edge. With companies like American Express, Chevron, and Boeing investing resources in ISDN, one can be sure that even the most enlightened network gains through ISDN access.

At 64K bit/sec, information transfer can occur about 6 1/2 times faster than at 9.6K bit/sec; 13 times faster than at 4.8K bit/sec; and 53 times faster than 1,200 bit/sec. For a terminal user at a remote location using a PC with a terminal emulator package over a 1,200 baud modem, ISDN is a panacea. Even for those users of high-speed modems, a 64K bit/sec clear digital channel is a great improvement given that most of these modems often fall back to lower speeds over analog lines. Data applications which go beyond file transfer and electronic mail are especially enhanced. With graphic images growing more widespread and application interactivity increasing along with easier to use interfaces, the need for higher speed pipes between processors is expanding exponentially. The popularity of multi-megabit LANs have demonstrated this need for bandwidth.

The speed of B channels won't have an impact on voice performance. 64K bit/sec is the speed at which today's voice conversations occur. However, because of the end-to-end digital aspect of the signal, voice quality will be noticeably better in the ISDN world. Imagine having the same signal quality across the country and the world as you are afforded when speaking with someone connected to the same digital PBX today.

An ISDN B channel does not fully support full-motion video transfer. Video requires bandwidth. A present day television set, if being serviced through digital technology, would require up to a 90M bit/sec bandwidth if uncompressed. The new High-Definition TVs (HDTVs) could easily double that requirement. Today's video codec technologies operate fairly well at 56K bit/sec, but actually achieve full-motion at 384K bit/sec. Certainly, the widespread availability of 64K bit/sec channels will make full-motion interactive video conferencing more easily accessible, but there must be greater improvements in quality before video can really take off at the desktop level. However, knowing that 64K bit/sec will be widely available for desktops makes it easier on companies reaching for better video quality. Instead of worrying about 9.6K bit/sec or lower speeds, the efforts can be aimed at 64K bit/sec, allowing for more focused research and quicker payback upon acceptance. There is nothing like the promise of revenue generation to motivate technology breakthroughs.


OSI - ISDN - SNA Relationships

CCITT Compliance. All the ISDN equipment and service providers work from the same set of ISDN "Red" books of standards. However, these standards leave a lot to be desired and interpreted. There is no guarantee that one vendor's ISDN equipment will work with another vendor's. As a matter of fact, more often than not, they probably won't. There is little in the way of conformance testing for ISDN products. There is no Corporation for Open Systems (COS) equivalent for ISDN. The North American ISDN Users' Forum serves as a good focal point for user likes and dislikes, but it is not taking responsibility for testing equipment and service interoperability. The trials and the early paying customers best exemplify who works with whom. The RBOCs and AT&T, because of their mediator-like role in ISDN in this

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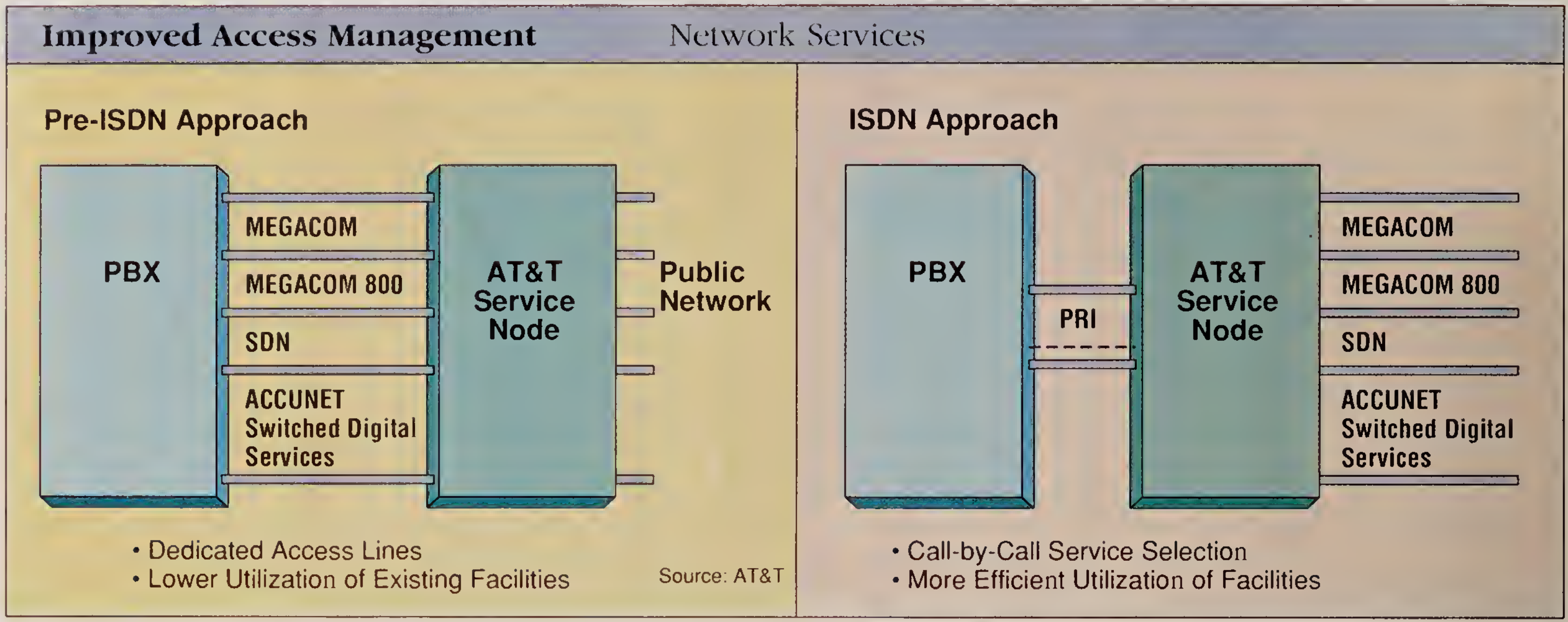
Real-World Centrex.

In the tidy world of diagrams, nobody ever moves to a new office. Or changes jobs. But in the real world, moves and changes create telephone chaos. Where can you find a phone system that puts you back in control? At your local phone company. With advanced Digital Centrex Service provided from the Central Office, you get to control, assign and service your own phone lines. Make your own moves and changes. Right from your own premises. Employees get to keep the same phone number no matter where or how often they move. And you get to keep your sanity. All thanks to the state-of-the-art 5ESS® Switch from AT&T Network Systems. Need a change? Make a move. Call your local phone company.

You and Your
Local Phone Companies

AT&T
Network Systems



Improved Access Management Network Services

- Dedicated Access Lines
- Lower Utilization of Existing Facilities

Source: AT&T

- Call-by-Call Service Selection
- More Efficient Utilization of Facilities

country, keep tabs on equipment being tested within their trial sites. (See box description of Southwestern Bell's ISDN test lab).

So what does one do to guarantee compatibility? Well, in essence, nothing. Customers must at least make sure that products were built to CCITT spec. Vendors of ISDN compatible equipment keep fairly up-to-date lists of other vendors that they work with. Most vendors are trying to expand these lists rapidly. Obviously, the longer your list, the better positioned you are to sell ISDN equipment. Customers should check to view working vendor configurations. Next, check the ISDN telco service provider's list of approved products. As the services come on-line and are tariffed, these lists will become more and more complete. Beyond these items, there is very little guarantee that your bright new shiny ISDN box will work with your new and wonderful ISDN service.

TARIFFS AND AVAILABILITY

Illinois Bell, the first BOC to tariff ISDN services, priced an ISDN BRI circuit at just under $30 a month. Their Centrex lines cost between $15 and $18 per month. Given that a BRI line offers 2.25 times the performance (who knows the potential functionality improvements), a 1.6 times price increase for ISDN BRI is a pretty good deal. It is expected that as other RBOCs tariff BRI, the price range will be between 1.5 and 2.0 times Centrex line pricing. As competition heats up, regulatory barriers crumble, and services become more ubiquitous, this pricing structure could decline even further to where an ISDN BRI line costs the same as today's Centrex line. However, this probably will not happen for at least two-to-five years.

By way of services, AT&T prices its PRI service at $400 per month, with a $3,000 installation charge. Their INFO-2 service, AT&T's ANI offering, is priced at two cents, which decreases to one cent for each call above 60,000 per month. That is, each caller's source number is provided to the receiving party for two cents per call. ANI is the current driving force behind all pre-processing of caller information.

APPLICATIONS

Telemarketing. The two primary examples of telemarketing applications are used by two of the earliest customers of AT&T's ANI service: American Express and American Transtech. American Transtech is one of the largest telemarketing companies in the U.S. and just happens to be an AT&T company. Both companies utilize information provided over the D channel to direct access to databases of information about a caller prior to talking with the customer. The look-up of the caller's information and the presentation of the information to the service agent occurs in parallel with call set-up to the agent. This processing takes place in milliseconds. The delay is not apparent to you or the agent. As a matter of fact, because of the efficiencies of the newer switches and facilities, all this additional processing activity could easily occur in less time than it would take for non-ISDN technology to simply complete a call. The productivity of the agent is enhanced and customer satisfaction increases. Both contribute toward more sales and repeat business.

At American Express, the process goes like this: a Gold Card member has a question about his or her account. They call their 800 number for client service. Prior to the phone ringing at the customer service agent's desk, caller information is received through the D channel by an AT&T PBX. Through a PRI interface, that information is passed to a computer system running a database application that matches the caller's data against their American Express history. Processed information, such as a copy of the latest bill, a list of outstanding charges, and some background on the account, is then routed to the service agent's terminal. That agent then picks up the ringing phone. Remember, this pre-processing takes literally fractions of a second and would be completely transparent to the caller.

Corporate Networks. In an age where individual company networks are being organized into one large corporate entity, it makes sense to have everyone talking the same language and having access to information wherever it may be. For years, many larger organizations have found themselves in the uncomfortable position of having to invest in and operate their very own telephone company in support of internal telecommunications needs. Through privatization and the growth of hybrid networks, corporations have taken on much more responsibility where their networks are concerned. In many cases, this responsibility has overwhelmed those within corporations ultimately responsible for such networks. IDC's research has indicated for some time that networking advancements have outstripped the ability of corporations to operate, manage, and plan them effectively. Given the shortage of staff and expertise and given the rather slow pace of intelligent network management systems development, this gap will only grow larger over the next few years. In this situation, IDC believes it makes perfect sense to offload a certain amount of network responsibility onto companies that specialize in the design, delivery, and management of networking equipment and services. This frees up resources that are better utilized when directed at primary business activities, such as manufacturing widgets, curing the sick, managing money, or flying planes. This is not to say that corporations should abandon networking concerns nor should they abandon their private networks. Rather, if ISDN is to provide intelligent services, then it is our responsibility to take advantage of this intelligence where appropriate, not try to reinvent our own.

Over the next five years, corporations will grow to realize that hybridization will principally involve mixing specialized private equipment with general-purpose ISDN public services.

Role in Government Networks. The government, mostly through the National Institute of Standards and Technology, is probably the biggest proponent of standardized networking technology. Witness the commitment to and effort involved in the FTS 2000 procurement, which was to date the single largest telecommunications project ever. Since ISDN is one of the two or three most influential standards in networking today, the defense and public agencies of the government would be well advised to start building toward ISDN. Network equipment purchased for use beyond three-to-five years (i.e., everything in the government) should be ISDN compliant. Due to their more demanding requirements for interoperability among very large organizations, the Department of Defense specifically should be aggressive in preparing itself for a combined voice/data/video wide area network comprised of ISDN equipment and services. Also, since many government installations utilize Centrex, those organizations will, in many ways, be best positioned to become ISDN customers within the next couple of years.

As far as applications are concerned, it is not readily apparent how applicable the early work in ISDN will be for the government. After all, the government is not in the telemarketing business. However, significant gains in performance and efficiencies will be made by simply utilizing the digital high-speed capabilities of ISDN public facilities. Considering much of the government's networking technology is based on older analog facilities and equipment, the technology of ISDN is viewed by much of the commercial world as being already available and will actually be quite a welcome upgrade for many government networked systems.

The aspect of security is also one that should not be overlooked. A more intelligent network is also able to be a more secure network. Things like out-of-band signalling allow for more intense scrutiny of traffic while eliminating the overhead and performance penalties usually associated with such scrutiny. Also, the software orientation of switching technology associated with ISDN provides a more flexible environment for implementing security features. An old hard-wired switch is not an easy thing to upgrade. A new ISDN processor will be much easier to tailor for specific requirements within different sectors of the government.

THE FUTURE

Timeline for Adoption. There are really two waves associated with ISDN acceptance and implementation. The first involves those companies with a large stake in consumer service. Any company that makes money by servicing a large client population should begin the process of ISDN implementation. American Express and American Transtech have broken new ground over the past year. Companies with a similar orientation should plan to make their own investment in ISDN within the next two years. Failure to make a commitment to ISDN within two years will result in a company being significantly behind in the service game.

ISDN User Profile

Nice Corporation

A 2,000-agent telemarketing company

Task at Hand

Processing more calls and decreasing the time spent on each order

Solution

ISDN Primary Rate Interface to transmit and receive customer data

Result

Dramatic reduction in $5,000 per month 9.6 bit/sec leased line

Savings

Millions of dollars annually

The second wave of ISDN utilization involves companies that would benefit from the non-application (i.e., lower level functional) gains realized by ISDN. Many of the early paying customers of ISDN (e.g., Chevron Information Technology Co., Tenneco, Inc., West Virginia University, Apollo Computer and Boeing Computer Services Co.) fit into this category. These companies are consolidating their voice and data networks, upgrading their facilities to higher bandwidth and digital capabilities, building greater flexibility into their wide area networks, taking a more enterprise-wide approach to networking and/or adding new premise equipment into their networking scheme. These companies presently derive little benefit from ISDN as a new-wave application platform. Instead, these companies will simply take advantage of ISDN as a provider of a flexible, digital, high-performance, and intelligent network technology. For organizations looking for similar gains in networking, implementation should spread out over the next six years. The early adopters will be those with less investment in distributed processing, LANs, and intelligent premise-based WAN management systems. Current users of Centrex are almost ideal candidates over the next two years. Beyond 1995, there will be few reasons not to make use of ISDN within some segment of an organization's network. The service will be that mature and ubiquitous.

Future Directions and Applications. Already basic specifications are established for BISDN. It is said that BISDN will be the real driving force behind ISDN technology acceptance and utilization. Because of the advancement of other technologies (e.g., LANs, value added networks, T-1, and T-3) and because of the tardiness of the initial ISDN products and services, the higher bandwidth and even more advanced services available within BISDN are viewed by larger and more sophisticated user organizations as the "real" ISDN. The Japanese have been very aggressive in preparing for BISDN. They are not necessarily ignoring today's standard ISDN, but rather, minimizing their commitment to it in light of the benefits of the higher speed BISDN.

Presently, ISDN's orientation toward the business market and limited availability restricts its ability to deliver on its promised worth. ISDN will finally deliver on all its promises and reach its full potential when the service becomes ubiquitous and reaches into the home. Technology, accessible through the home, is not nearly as sophisticated as that which has spread throughout large, medium, and even small businesses. Whereas businesses may need to fully justify the displacement of already sophisticated technology, the home user has only to displace an analog telephone set and maybe a PC modem. And the services offered to the home, such as call forwarding, video telephony, voice/data mail, and videotex, are some of the most exciting for ISDN. △

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PCs & WORKSTATIONS

MICRO BITS

Charles von Simson

Better watch your mouth

Don't mention the "U" word to Bill Gates (pssst, it's Unix). His patience on the subject is getting shorter all the time. Ask Microsoft's founder about the system as a competitor to OS/2, and his knee starts bobbing like a sewing machine needle, and a bite comes into his already clipped speech.

And whatever you do, don't mention Steve Jobs and his Mach/Unix-based workstation. Gates is tired of being asked whether he is concerned about Next systems as a corporate alternative to OS/2. This is not Hollywood, he replies. Customers will be sophisticated enough to make their own choices.

While it is unlikely that Gates' tormentors will ever give up, he may ultimately be vindicated. He maintains, with some accuracy, that Unix is a many-segmented market, one in which Jobs' Mach is in no meaningful way related to the Motif-based Open Desktop from The Santa Cruz Operation, never mind DEC's Ultrix or IBM's AIX flavors of Unix for large systems.

"If Steve's machine succeeds, it will be like the Mac," Gates claims. "It is not an open architecture."

And armed with the conventional wisdom that 4M-bit dy-

Continued on page 64

PC buying boom may be down but not out

ANALYSIS

BY RICHARD PASTORE
CW STAFF

It has been almost a decade since the first IBM Personal Computers showed up on corporate desktops, and some industry pundits claim that U.S. businesses have finally reached the PC saturation point. Yet most analysts and users recently contacted by *Computerworld* said that although the buying boom is over, there is still room for significant PC growth.

High-end upgrades for old machines and continued replacement of host-based terminals will account for the bulk of new sales in the short term, analysts agreed. In addition, advanced technologies will power growth of the high end through the early 1990s.

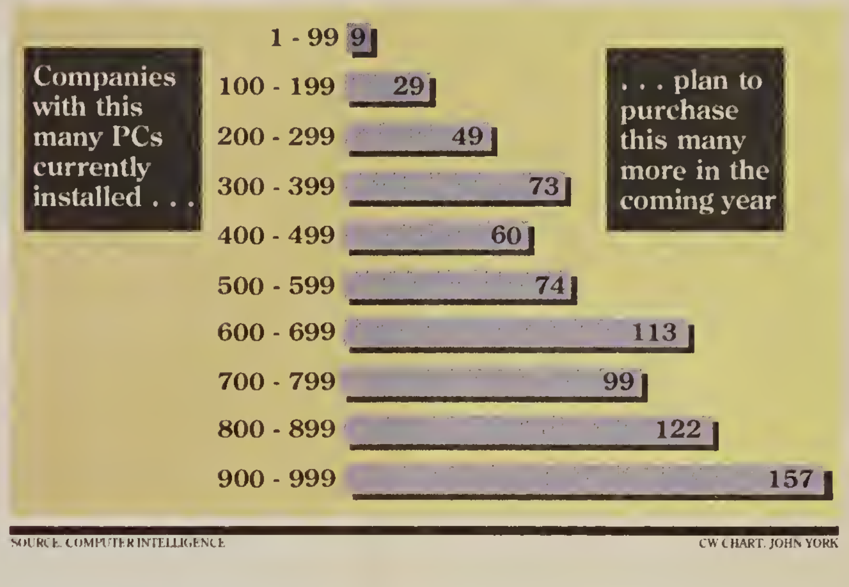
"There is now a very high ratio of PCs to white-collar workers, but many of those PCs are ancient models that are likely to run out of steam soon," said Leslie Fiering, an analyst at Gartner Group, Inc. in Stamford, Conn., and a member of the executive board of the Microcomputer Managers Association. "A higher percentage of the new purchases will be upgrades and replacement machines."

Today's and tomorrow's complex application software and operating systems will drive the replacement of the old boxes, predicted Dan Ness, an analyst at Computer Intelligence in La Jolla, Calif. "The PCs they do have may be 5-year-old Com-

Continued on page 65

New additions

Companies buying PCs plan to increase their installed base by a range of 10% to 16% during the next year



SOURCE: COMPUTER INTELLIGENCE

CW CHART: JOHN YORK

486-based PCs run K Mart's retail show

BY RICHARD PASTORE
CW STAFF

TROY, Mich. — Though K Mart Corp. features Commodore and Nintendo computer systems on its store's retail floor, the nation's No. 2 retailer is not playing games with its new K Mart Information Network II (KIN II).

In-store, state-of-the-art Intel Corp. 80486-based personal computers will soon be running the retail show from the store manager's office.

K Mart's Carlson

K Mart has purchased its initial order of 1,000 486-based Unisys Series 6000 computers to run its inventory control system, KIN II. The boxes will be up and running in all 2,300 stores by the end of 1994, according to David M. Carlson, senior vice-president of corporate information systems.

The Unisys PCs will join a technical lineup that includes an IBM 3090 and Amdahl Corp. 5990 at K Mart's headquarters and a GTE Spacenet Corp. satellite network that links the mainframes to the store's PCs. K Mart is also implementing an in-store network of handheld Telxon Corp. 750 terminals that will be linked to a 486 by a radio-wave network.

Fill in the holes

With KIN II, K Mart is hoping to control inventory better by automating a lot of the tedious merchandise-overseeing functions with which store managers contend daily. In high-volume retailing, empty shelf space is like a black hole sucking up potential profits. KIN II gives store staffs power to speed up the elimination of these merchandise holes, Carlson said.

Using the handheld unit, a clerk can scan an item's bar-code label, which is affixed to the shelf. The unit accesses the master merchandise file on the 486 box via radio waves. When the information is relayed back, the unit will display the item's description, price, order status and whether any new units have been received. The clerk can then determine, for instance, that a case of that item was received yesterday and requires immediate attention.

KIN II is only part of K Mart's

Continued on page 66

Inside

- Price Waterhouse networks for Notes. Page 63.
- Dataquest reports frenetic workstation growth, PC slump. Page 63.

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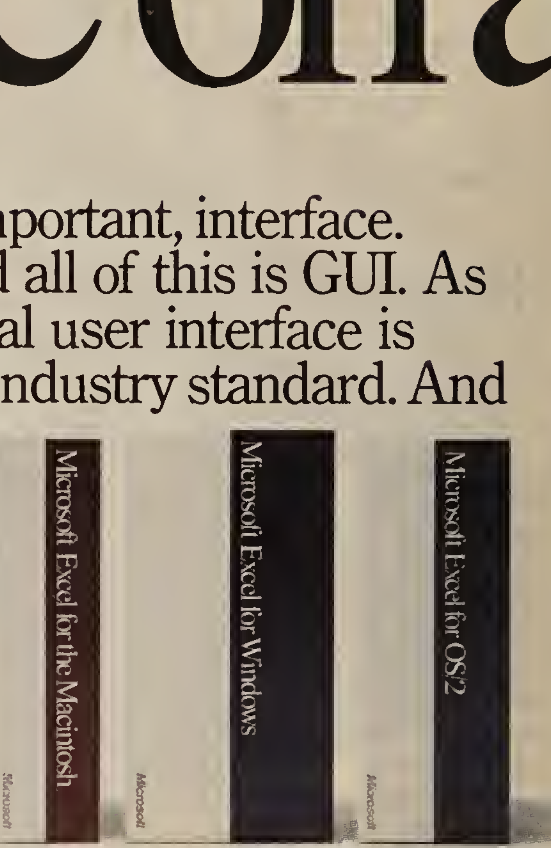

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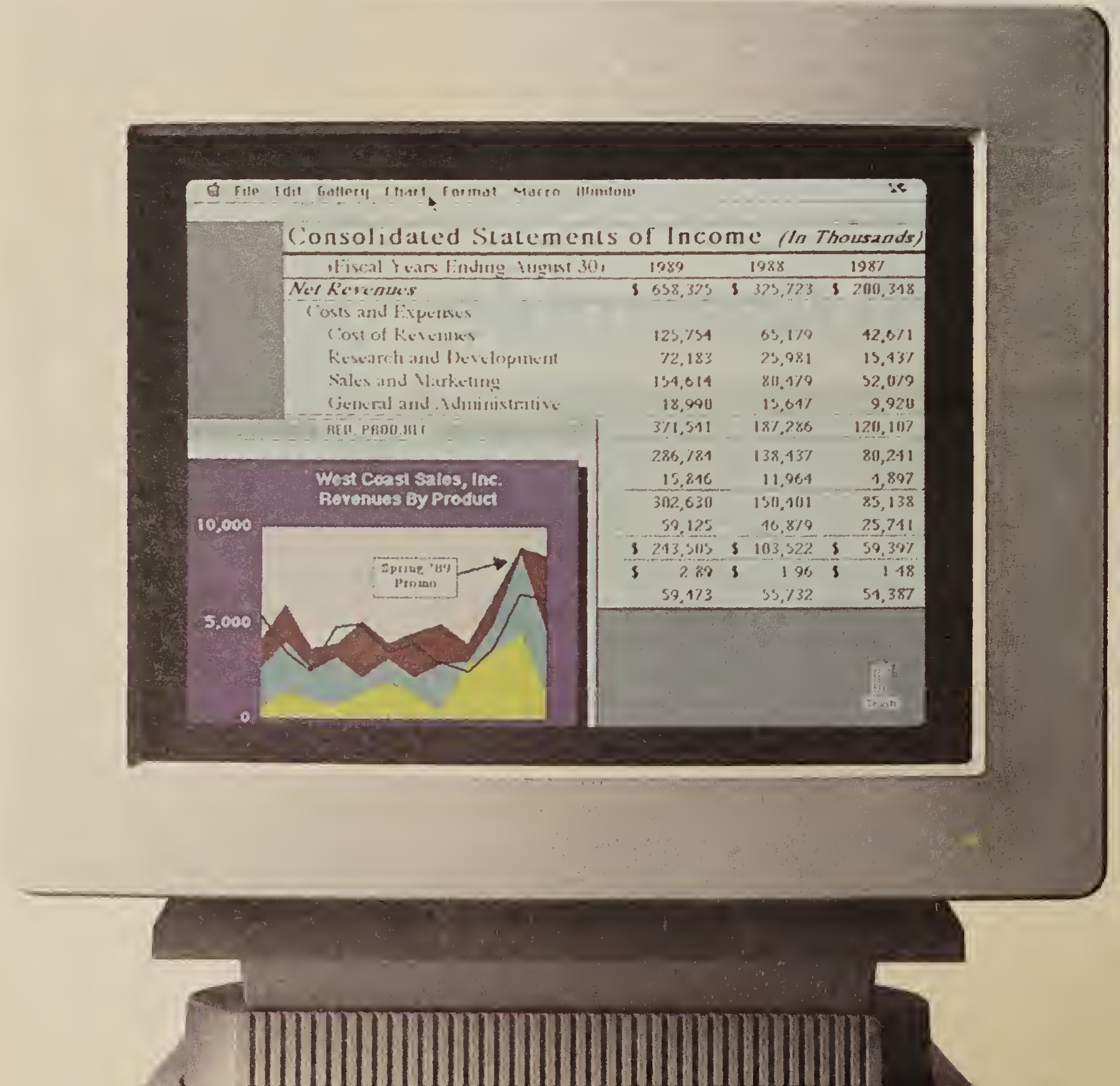
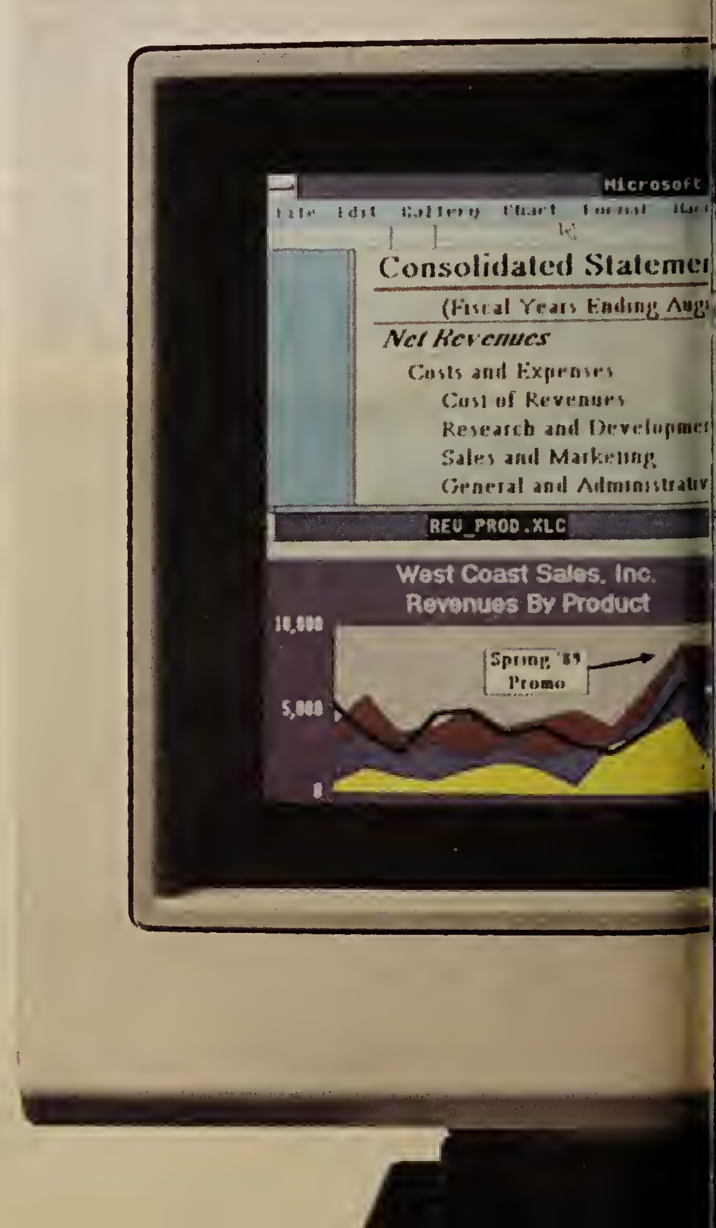


Consolidated Statements of Income *(In Thousands)*

(Fiscal Years Ending August 30)	1989	1988	1987
Net Revenues	$ 658,375	$ 375,723	$ 200,348
Costs and Expenses			
Cost of Revenues	125,754	65,179	42,671
Research and Development	72,183	25,981	15,437
Sales and Marketing	154,614	80,479	52,079
General and Administrative	18,990	15,647	9,920
	371,541	187,286	120,107
	286,784	138,437	80,241
	15,846	11,964	4,897
	302,630	150,401	85,138
	59,125	46,879	25,741
	$ 243,505	$ 103,522	$ 59,397
	$ 2.89	$ 1.96	$ 1.48
	59,473	55,732	54,387

DOS-Windows 286/386



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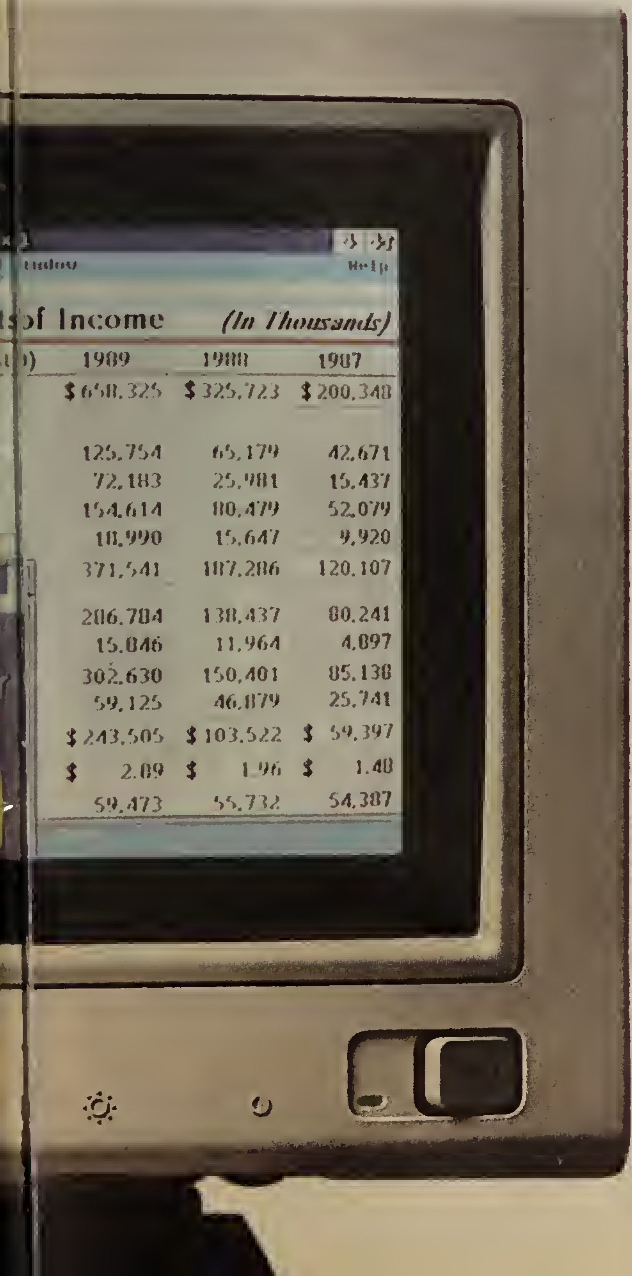
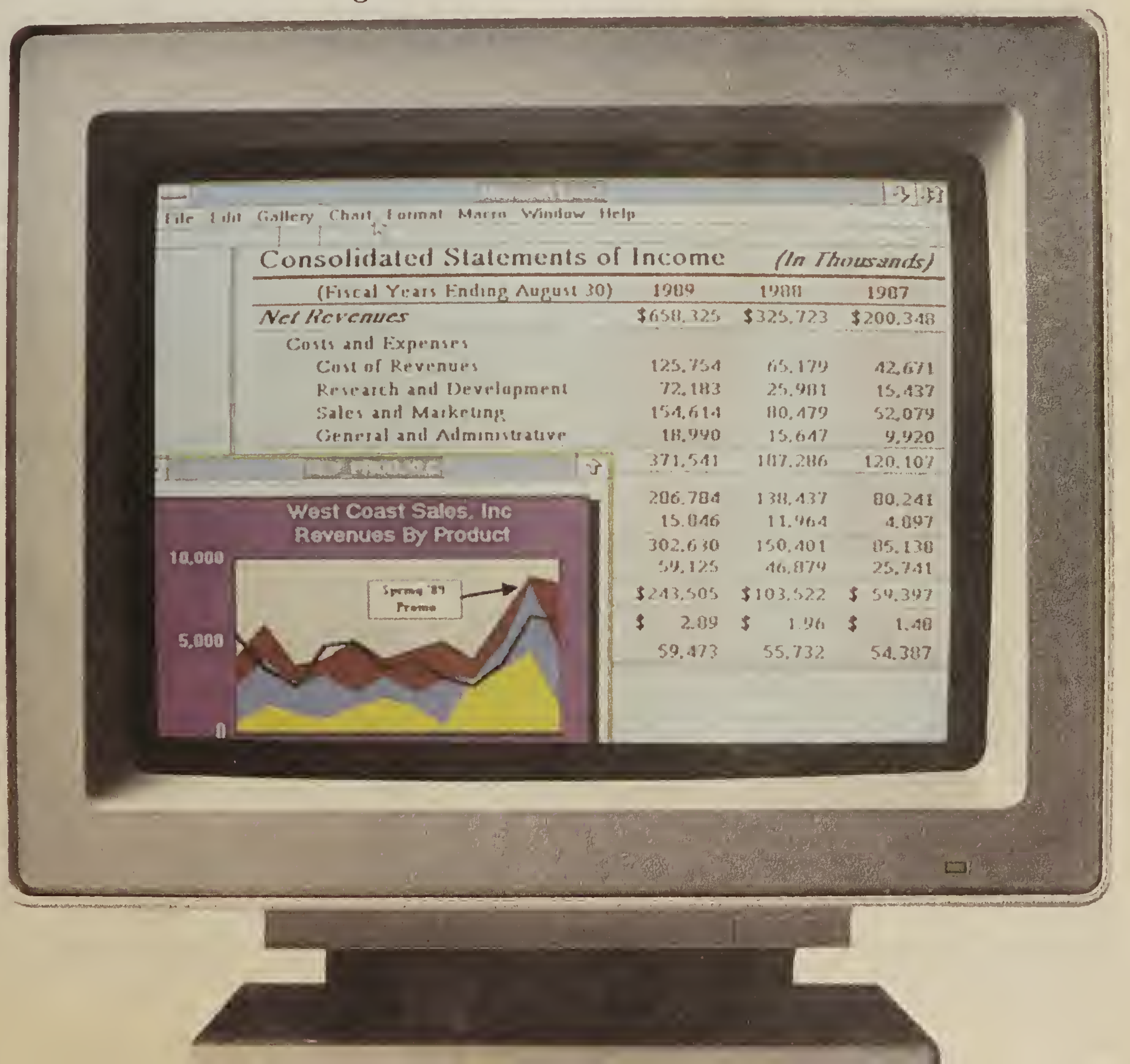


OS/2-Presentation Manager



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	286,784	138,437	80,241
	15,846	11,964	4,897
	302,630	150,401	85,138
	59,125	46,879	25,741
	$243,505	$103,522	$ 59,397
	$ 2.89	$ 1.96	$ 1.48
	59,473	55,732	54,387

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Price Waterhouse takes Notes

Financial firm's branches hope to make the most of networked package

ON SITE

BY PATRICIA KEEFE
CW STAFF

WASHINGTON, D.C. — When Lotus Development Corp. floated its $62,000 Notes groupware package before some major corporations, it landed a whale of an account. Seizing an opportunity to unite the far-flung reaches of the financial services firm, Price Waterhouse Chief Information Officer Sheldon Laube went out on a limb and bought 10,000 packages in one fell swoop.

The level of excitement generated throughout the company [see story page 81] was such that one of its Washington, D.C., branch offices demanded to be networked by Christmas in order to gain access to Notes. Today, although the 129 personal computers at the Washington National Tax Service (WNTS) are not all connected yet, 35 users are up and running on a cutting-edge local-area network.

"It's true that the main purpose of this network is to use Notes. There are no other applications running over the network," said WNTS technical coordinator Nancy White, the lone information manager for about 129 PC users on a staff of 200. However, she also cited a corporate edict calling for all branches to be networked by 1993.

White, who previously served in the Denver branch as a systems manager for Digital Equipment Corp. VAXs, said she was initially a little apprehensive about her LAN assignment. Things have gone smoothly, however, thanks in part to Notes and to assistance from Price Waterhouse's National Information and Technology Center (NITC) in Tampa, Fla.

The Washington LAN will be installed in phases and might eventually be bridged to another group that is currently linked to a VAX 8350 via DEC's PCSA software, White said.

Based on a recommendation from Jim Holloway, a senior technical specialist at NITC, White has replaced 35 Intel Corp. 80286-based PCs with IBM Personal System/2 Model 55SXs equipped with 30M-byte hard drives.

Future upgrades

Although White opted to replace the 286 platforms for the initial segment, she did not rule out board upgrades in the future. She has "rolled over" the displaced 286s to staff members who are in need of computers.

The 386-based boxes are attached to two Compaq Computer Corp. Systempro 386-based file servers, one of which functions as a dedicated Notes server. " I don't think there is a deliverable 486 [computer] on the market that can approach the speed of the Systempro," Holloway said.

For now, users will continue to run their word processing and spreadsheet applications off of their hard disk drives.

The network itself is composed of IBM's Token-Ring, unshielded twisted-pair cable and Novell, Inc.'s Netware 386 network operating system. The LAN uses a modem to share information with other offices.

So far, White said she is impressed with the Systempro. Acknowledging that 35 users hardly tax the server, she said: "I don't foresee maxing out the Systempro [once the entire office is networked]; I'm not even worried about it." White is responsible for the network's design, which includes establishing security levels, setting up groups, defining directories, installing printer mechanisms and providing both network and Notes training. "It's only taken me a couple of weeks, and I'm pretty much done," she said. After training users on LAN basics, such as how to save files, she said Notes is scheduled to come online this week.

Beyond providing day-to-day contact and fostering a teamwork approach to solving clients' problems, Notes can also be used as a knowledge repository of staff expertise. This has already benefited the WNTS office, which has yet to complete Notes training. "I haven't even looked at the documentation," said White, who already takes advantage of Notes daily to keep in contact with Holloway in Tampa regarding the LAN project. "When I get into Notes, it's real obvious what to do. [Notes] has a window interface, and it's real easy for me to use."

White is already sharing databases for experimental purposes with Tampa. "Notes is a textual database — it's fantastic," Holloway said. He added that the PC world has long lacked such a windows-based front end.

While NITC uses Notes to track technical problems and pricing lists, White uses the system as a database for technical information concerning her network. "Already, Notes has been beneficial to me in my position for technical support. It saves a lot of time with telephone tag."

Workstation market leaving PCs far behind

BY JAMES DALY
CW STAFF

SAN JOSE, Calif. — While the personal computer market bogs down, sales of its more powerful desktop cousins in the workstation world continue at a frenetic pace, according to a report issued by research firm Dataquest, Inc.

Propelled by a combustible mix of price declines and performance enhancements, the worldwide workstation market grew 40.2% to $6.1 billion last year, and it is expected to keep growing 30% annually for the next five years, said the San Jose, Calif.-based organization.

The shift has occurred because PCs no longer have a monopoly on the ability to provide a lot of power at an affordable price, according to the report. Many workstations now cost less than $10,000, and they can be up to three times more powerful than PCs. Digital Equipment Corp.'s Decstation 2100, for example, is capable of processing more than 10.4 million instructions per second and is priced at $7,900, the report said.

"The PC market has hit a saturation point in many sectors, while workstations have really come into their own on the price/performance front," said Kathleen Hurley, an analyst at Dataquest.

Workstations have also touched a common denominator in their reliance on the widely accepted Unix operating system, Hurley said. Unix offers an open environment that gives users the ability to run multivendor systems, while most PC operating systems are still proprietary.

Additionally, workstations are catching up on the software front, the report added. Although workstations traditionally lacked the variety of software that is offered by PCs, this situation is rapidly changing. Less than three weeks ago, for example, Lotus Development Corp. announced a Unix version of its immensely popular 1-2-3 spreadsheet program [CW, Jan. 22].

Dataquest ranked Sun Microsytems, Inc. as the leader in the workstation market with a 28.7% share.

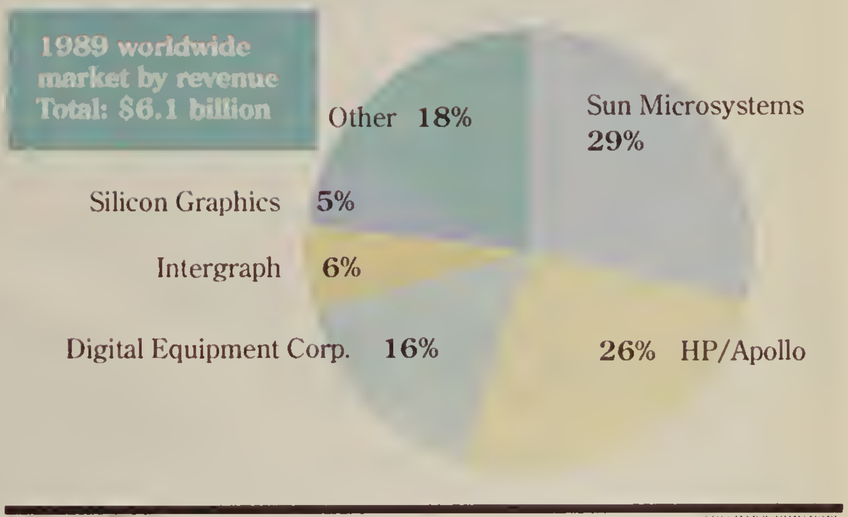
Hewlett-Packard Co. and its Apollo division came in second with 26.4%, while DEC captured the third position with 15.9%, which is down from 17.6% in 1988. Intergraph Corp. came in fourth with a 6% share, and Silicon Graphics was ranked fifth with 5.2% of the 1989 market.

The Dataquest report also noted that the HP buyout of Apollo, as well as the merger of Ardent Computer Corp. and Stellar Computer, Inc., marked the first occasions in the workstation market's history that consolidation has occurred.

Many analysts also believe that except for laptops, standalone PCs will continue to face slower sales and price pressures.

Sun shines

Sun not only held onto its top position in the workstation market, it expanded its market share from 27% to 29%



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Von Simson

FROM PAGE 59

namic random-access memory capacity will boom in the next year, OS/2 marketers may rightfully convince customers that OS/2's memory requirements are not an important issue and that the 2M-byte threshold is of only limited importance in the shortest term.

On Wall Street, that message has begun to take hold. Traders and others making $150,000 per year already have OS/2 on their brand-new systems (if they aren't already using Unix from DEC or Sun). But for someone in that salary range, the technology platform under them is not very cost-sensitive.

On that platform will come the release of the 32-bit version of OS/2, said to be a better DOS than DOS by allowing coexistence of applications on the operating system. This in turn eases the concerns of most corporate managers gathering strength for a migration.

Gates may ultimately be vindicated, but everybody, including Microsoft, is hedging their bets. IBM will only go into its version of Unix in a bigger way with the RT and its relationship with Jobs. There is no serious vendor in the PC segment of the industry that is not up to its hips in Unix, even as they stay with OS/2 in case it really takes off.

For applications developers such as Lotus, the great unwashed installed base of PCs for people making maybe $50,000 per year, with hardware platforms at 640K bytes and below, still represents 70% of their business. Mass-market acceptance of OS/2 and corporate standardization on the system will require bringing them along, and they will come way behind a 4M-byte DRAM glut.

Jim Manzi, among other notables, already views Unix as a significant landmark on the horizon. The 1-2-3 spreadsheet for Sun has been announced and will certainly be migrated to other Unix platforms. Ditto for the many powerful systems from vendors such as Informix Software and Sybase, not to mention the growing number of developers working on Steve Jobs' Nextstep platform.

Most developers agree that good implementations of applications can transcend the differences between different flavors of Unix. Lotus clearly sees it as a unified market requiring minimally changed permutations of a product line. "I can certainly understand why Bill Gates says there is no Unix market for PCs," Manzi said recently. "But we believe there is a strong one and will put our money and development effort behind it."

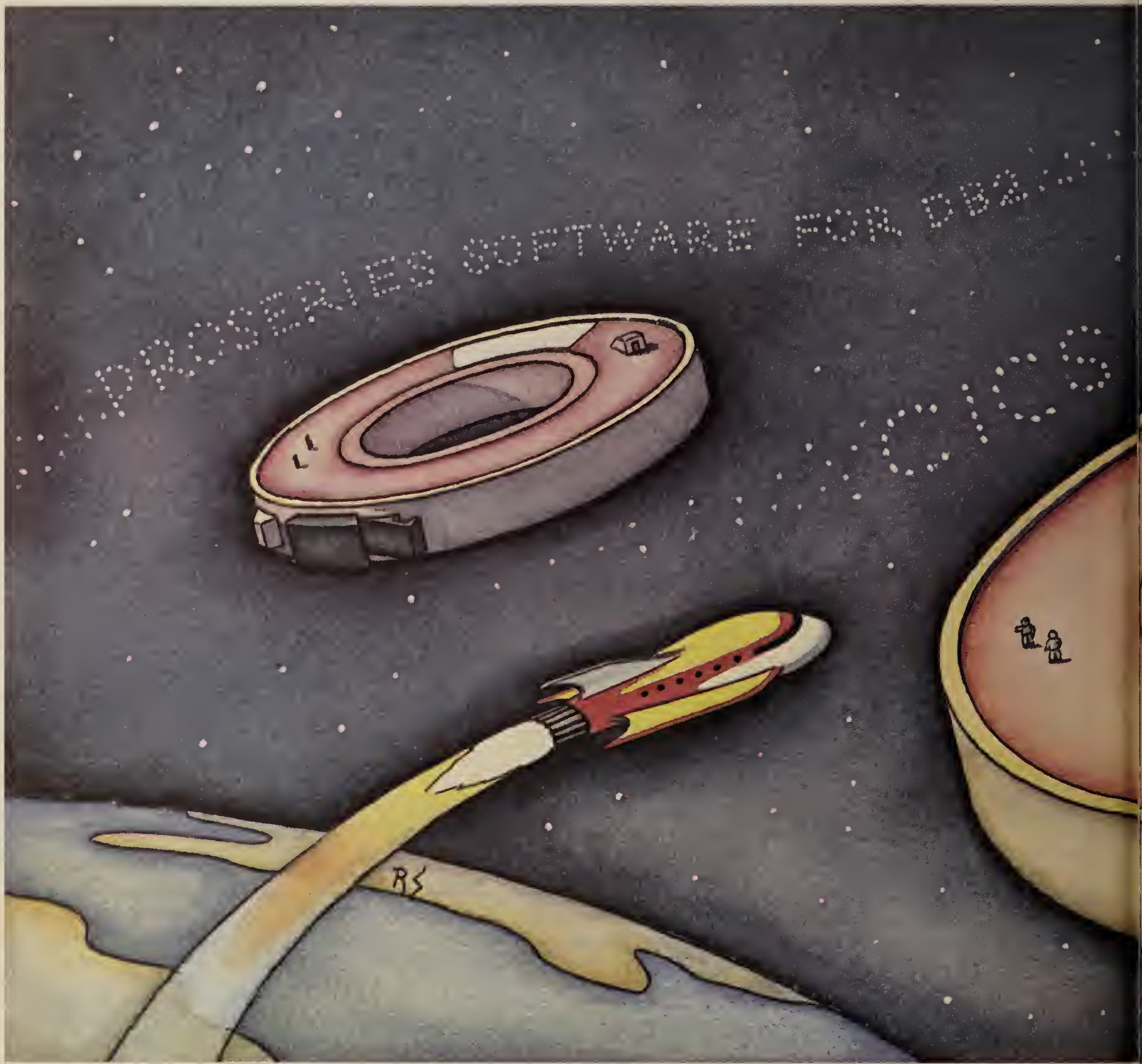
Finally, despite all the photos of a smiling Bill Gates and IBM Entry Systems Division President Jim Cannavino, there is deep concern among both developers and OS/2's few large customers that the relationship may not be durable for the long haul. "When the two of them are in a room together, the messages are identical," one big customer said. "But talk to them separately, and the message has a tendency to wander."

> GATES MAY ULTIMATELY be vindicated, but everybody, including Microsoft, is hedging their bets.

That sort of uncertainty can be contagious, and the relatively open alternative, some flavor of Unix, may get more attractive. For the risk-averse, there is the perception that at one point Unix came from the "Phone Company" and, while imperfect, is at least not controlled by two uneasy partners.

Bill Gates has confounded everyone by being so consistently right and has some solid reasoning behind his views. Now he is talking about 1990 being the year that OS/2 hits the elbow of an upward sales curve. For that to happen, more people than Bill Gates are going to have to shun the "U" word.

Von Simson is a *Computerworld* West Coast senior correspondent.



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ProSeries Software is a group of products that makes it easier to work with DB2. With ProSeries you can manage DB2 objects without SQL. With its ISPF-like interface, you can test DB2 applications more efficiently. And since it also lets you embed SQL directly into

Buying boom

FROM PAGE 59

paqs, and when they start bringing in Microsoft Word for everybody, that machine's not going to run it," Ness said.

Often, the old machines trickle down to the desktops of users who require less power from a box. But the ousted boxes are increasingly winding up in employees' homes, where they serve as "second" machines for home use, observers said.

Though the days of wholesale replacement of terminals with PCs are long gone, "there are still millions of dumb terminals sitting on people's desks that are likely candidates for replacement," said Frank Mischnoff, an analyst at Meta Group, Inc. in Westport, Conn.

Piedmont Natural Gas Co. in Charlotte, N.C., needs to outfit about 25% of its users with PCs. "We've been growing at the rate of 60 systems a year for the last three years, and a lot of those are replacing mainframe terminals," said Chris Wiggins, the firm's microcomputer analyst.

Plano, Texas-based J. C. Penney Financial Corp. replaces terminals with PCs at the rate of three or four per month, said data processing supervisor Sid Hilton. "We are by no means saturated. There are still 200 desks [out of about 1,000] that could get a computer," Hilton added.

The Florida Department of Agriculture in Tallahassee has only 300 PCs for its 3,800 employees. The goal was to have one PC for every eight workers, MIS director James Ratliff said. "We still have a way to go to get where we'd like to be," he noted.

However, such sentiments are not unanimous. Some users see the saturation point approaching rapidly. "There are only 20 programmers left that are using terminals. When those are replaced with PCs, then we'll have reached saturation," said William Davidson, technical support manager at Ernst & Young's national data center in Lyndhurst, N.J. "At that point, whatever you do, you're going to have to throw something away."

Blue Cross and Blue Shield of Utah is also nearing the saturation point. "We don't have that much need for new PCs; those people that need them already have them," said Kim Gooch, director of application development and former PC manager. "About the only reason we buy a new PC is because someone needs more speed."

> "ABOUT THE only reason we buy a new PC is because someone needs more speed."
>
> KIM GOOCH
> BLUE CROSS AND
> BLUE SHIELD

Rather than taking such comments as harbingers of doom, some analysts predict that new applications will increase the pool of potential PC users. Also, once technologies mature, "you'll see a lot more mission-critical applications running on local-area networks," boosting demand for PCs, Mischnoff said.

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K Mart

CONTINUED FROM PAGE 59

investment in information technology. The firm said it will spend $1 billion on its systems between 1981 and 1991, including development and maintenance. The company also predicts a payback of $300 million per year in reduced expenses-to-sales ratios.

K Mart is not the only discounter souping up its systems. Archrival Walmart Stores has a similar inventory-control network already up and running. "We compete with Walmart as aggressively as we can," Carlson said. He noted that managers at both retailers "have a very high commitment to using technology as a strategic weapon."

K Mart chose the 486 platform for its power and rapid response time. "In a sense, it will act as a network server for a fairly complex local-area network," Carlson said. Store staffers patrolling the aisles "can tolerate a one- or two-second delay, but not a five- or 10-second delay. So we've got to make sure we have a fairly quick response time."

The move from the old KIN I to the KIN II system will not be a piece of cake for K Mart, but it is necessary from an economical and strategic perspective. KIN I consists of about 400 assembler-based merchandising programs running under a proprietary K Mart operating system. The hardware platform is made up of IBM Series/1s that are as much as 11 years old.

"You can imagine the cost of maintenance of the 400 assembler-level programs and our own operating system," Carlson said. "In retailing, one should focus on customer service, not on maintaining proprietary operating systems."

K Mart will drop its own operating system in favor of Unix. K Mart's systems staff will migrate the programs to the new system, often enhancing their functionality. Only 20 of the 400 have made the leap so far, Carlson said. The entire program portfolio should be ported by the end of 1994, he noted.

The system is in full gear at three pilot stores, Carlson said. He said he expects the first shipments of the 486 boxes in three months.

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NEW PRODUCTS

Systems

Cadre Technologies, Inc. has enhanced its Software Analysis Workstation platform with the addition of the P1750A Probe. The probe provides an interface between the workstation and the target, allowing engineers to debug and test software for 1750A-based applications.

The product is connected using coaxial "flying leads" and supports data acquisition on as many as 24 address lines, 16 data lines and eight status/control lines, the firm said.

It allows the target to run at speeds up to 40 MHz with zero wait states and can also measure every occurrence of the code being tested.

The product's price is $3,500.

Cadre Technologies
19545 N.W. Von Neumann Drive
Beaverton, Ore. 97006
503-690-1300

Mobius Computer Corp. has announced the Protege Series, a line of personal Unix workstations based on Intel Corp. 80386 microprocessors.

The series includes the X Window System, is based on Unix System V, Release 3.2 and offers Xenix binary compatibility. MS-DOS compatibility is also available as an option.

The systems accommodate development platforms for software engineers writing X Window System applications or porting DOS applications to Unix, according to the company.

The workstations range in performance from 3.2 million to nearly 8 million instructions per second. Base configurations, which include 4M bytes of internal memory, are priced from $3,995 to $7,995.

Mobius Computer Corp.
1717 Embarcadero Road
Palo Alto, Calif. 94303
415-493-7777

Software applications packages

A personnel management program that combines an employee database with graphically controlled scheduling is available from Craig Systems, Inc.

Schedulemaker PC runs on IBM Personal Computer ATs and compatibles and features user-definable fields and drop-menu control functions.

The program costs $395.

Craig Systems
16717 Monitor Ave.
Baton Rouge, La. 70817
504-291-6348

Landcadd, Inc. has announced Videoscapes, a software package designed for use with Autodesk, Inc.'s Animator program.

The software package is targeted for land planning professionals and customizes Animator to provide a photo-realistic, animated site portrait.

The product requires an Intel Corp. 80386-based personal computer and an IBM Video Graphics Array card.

Videoscapes is priced at $495.

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Not only does the Model 12 perform like a desktop PC, it has the same touch. The AT-style keyboard provides full-size, full-travel keys that give your fingers plenty of room.

Other features include an easy-to-read, enhanced Supertwist backlit LCD screen. A removable 3.5" high-density diskette drive provides additional flexibility and convenience — snap it on for loading software or remove it and travel light. And, sending critical work to your office takes only a phone call with an internal modem.

The TravelMate LT286 Model 12: the laptop that doesn't compromise performance for size.

The removable 3.5" high-density diskette drive and internal modem are optional.

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In addition, an intelligent power management system turns off the screen and fixed disk drive during periods of inactivity to extend battery life, allowing you to use the laptop longer.

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DTBRO

DATA STREAM

Ellis Booker

Titanic sinks at AT&T

When the "big board" at AT&T's network management center in Bedminister, N.J., lit up like a Christmas tree with alarm signals last month, those in the room must have thought they were witnessing the unthinkable — the day a hacker had succeeded in entering the brain stem of the world's largest communications network.

However, there was no hacker. AT&T, quick to diagnose the Martin Luther King Jr. Day outage and so escape a public relations nightmare, now states with confidence that the nine-hour spasm in its network was caused by a previously undetected logic bomb of AT&T's own making. The bug had lain dormant since December and was part of a software addition to AT&T's Signaling System 7 network. Ironically, that new signaling software was supposed to be a redundant precaution to make the network less vulnerable.

Outside AT&T, a few lone voices continue to push variations on the hacker/inside job theory. Like a medical malpractice lawyer, they seem unwill-

Continued on page 75

Giving networks an Openview

BY ELISABETH HORWITT
CW STAFF

CUPERTINO, Calif. — Users and analysts alike hailed Hewlett-Packard Co.'s recently announced Openview Network Server and Node Manager, which is scheduled for midyear availability, as what may be the first commercially viable platform for managing Transmission Control Protocol/Internet Protocol (TCP/IP) as well as HP networking environments.

"HP still will be ahead of everyone else if they deliver [the new system] by year's end," said Gartner Group, Inc. Vice-President Jeremy Frank.

The Los Angeles County Transportation Commission is interested in HP's Openview Network Node Manager software as a way to manage its existing Starlans as well as the bridges and long-distance links that should shortly interconnect them, IS manager Walter Stephenson said. In addition, HP's announced capability of troubleshooting across both networking and host-based systems "would be very useful," Stephenson added.

Easier diagnosis

HP's Openview interface could make it easier "to distinguish between a machine performance and a LAN performance problem," said Ray Thomas, manager of office automation at Hadson Corp. in Oklahoma City.

Among the key components of the Openview Network Management Server are the following:

- A Unix-based, distributed client/server environment said to enable users to access management functions and data from anywhere on the network.
- An application programming interface (API) said to facilitate the development of applications — e.g., for managing additional types of equipment. The API is also said to enable applications to work across whatever user interface, database and networking protocols the user happens to prefer.
- Data Management Services, a proprietary, hierarchical database repository designed to keep track of network management statistics that can reside on servers across the network, HP said. The system also has hooks for adding database systems, such as SQL-based relational DBMSs optimized for report generation and ad hoc queries, as well as an object-oriented database geared to managing both the logical and physical aspects of a network, HP spokesman David Mahler said.

However, the system lacks a number of more ambitious features that should appear in subsequent releases, HP spokesmen indicated. These include the following:

- Full integration with HP's object-oriented Openview environ-

Continued on page 70

Firms seek their magic number through ISDN

ANALYSIS

BY MITCH BETTS
CW STAFF

Imagine a customer service agent whose computer terminal can identify a caller's telephone number and automatically retrieve the customer's record — even before the voice call on the 800 line is answered.

Callers greeted with "Hello, Ms. Jones," may call it spooky. However, analysts call it a computer-integrated telecommunications system, a strategic networking application that can give early implementers a competitive advantage, according to a report by The Yankee Group, a Boston-based consulting firm.

In essence, the system requires automatic number identification, a feature of public carriers' Integrated Services Digital Network (ISDN) offerings, as well as software interfaces between the user's private branch exchange and computer database applications.

"At a time when users still resist ISDN for lack of benefits, computer-integrated telecommunications promises to leverage ISDN's raw, low-level . . . capabilities with high-level enhanced applications," said The Yankee Group's report.

Automatic number identification has numerous applications, particularly in customer service and inbound telemarketing. A pioneer user in this field is American Transtech, Inc. in Jacksonville, Fla., a telemarketing subsidiary of AT&T that handles a high volume of incoming 800 calls for numerous business clients. The firm's Dealer Locator program uses automatic number identification to match the caller's location with a database of local dealers for the products of a particular company, a spokesman said.

The list of local dealers is displayed on the agent's screen even before the call is answered — so the answer actually precedes the question — or it can be routed to a voice-synthesis unit that provides the same information.

Union Pacific Railroad Co. has taken the automatic number identification application one step further at its customer service center in St. Louis. The center uses an automatic call distributor that captures the phone number of callers who receive busy signals or are disconnected before an agent can answer.

Continued on page 75

Inside

- Fractional T1 products take a bow. Page 74.
- Channel extender hooks to popular management systems. Page 74.
- Texas firm has big plans for ISDN. Page 75.

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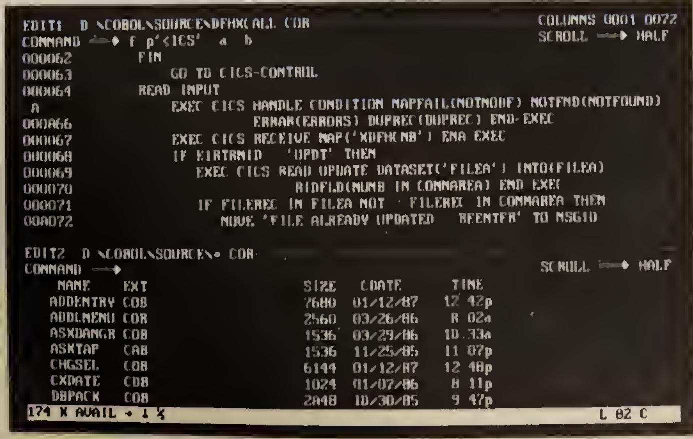

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EDIT1  D \COBOL\SOURCE\DFHXCALL COB                           COLUMNS 0001 0072
COMMAND ——► f p'<ICS'  a  b                                   SCROLL ——► HALF
000062         FIN
000063             GO TO CICS-CONTROL
000064         READ INPUT
 A                 EXEC CICS HANDLE CONDITION MAPFAIL(NOTMODF) NOTFND(NOTFOUND)
000A66                       ERRAR(ERRORS) DUPREC(DUPREC) END-EXEC
000067             EXEC CICS RECEIVE MAP('XDFHCMB') ENA EXEC
000068             IF EIBTRNID   'UPDT' THEN
000069                EXEC CICS READ UPDATE DATASET('FILEA') INTO(FILEA)
000070                            RIDFLD(NUMB IN COMMAREA) END EXEC
000071                IF FILEREC IN FILEA NOT  FILEREC IN COMMAREA THEN
000A72                   MOVE 'FILE ALREADY UPDATED   REENTER' TO MSGID

EDIT2  D \COBOL\SOURCE\* COB
COMMAND ——►                                                   SCROLL ——► HALF
    NAME     EXT                    SIZE   CDATE      TIME
   ADDENTRY COB                     7680  01/12/87   12 42p
   ADDLMENU COB                     2560  03/26/86    8 02a
   ASXDANGR COB                     1536  03/29/86   10 33a
   ASKTAP   CAB                     1536  11/25/85   11 07p
   CHGSEL   COB                     6144  01/12/87   12 48p
   CXDATE   COB                     1024  01/07/86    8 11p
   DBPACK   COB                     2A48  10/30/85    9 47p
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Stratacom has bandwidth as you need it

BY ELISABETH HORWITT
CW STAFF

CAMPBELL, Calif. — Stratacom, Inc.'s next-generation IPX switch, announced recently, is said to provide user devices such as local-area networks with bandwidth on demand by using the Frame Relay standard now being finalized by CCITT.

The new Frame Relay Interface incorporated into Stratacom's IPX Fastpacket switch is said to multiplex voice and data transmissions from a variety of user devices, packetize them and intermix them over a T1 channel. This eliminates the need to allocate static 56K bit/sec. circuits to individual devices, according to Stratacom director of product marketing David Owen.

The advantages of such a switch are twofold, according to James Herman, president of Boston-based Northeast Consulting Resources, Inc. First, available bandwidth is much more efficiently utilized, since devices are only allocated bandwidth when they need it.

This is crucial for LAN-to-LAN interconnections, which tend to require large chunks of bandwidth for short periods of time, since the switch can dynamically provide up to the full T1 link to a LAN device if traffic warrants it but can fill the bandwidth with other types of transmissions, such as voice, when traffic dies down, Herman said.

Second, with the Frame Relay Interface, the switch no longer needs to allocate a circuit for each destination it is sending to, Herman said. Because each packet has its own destination header, multiple devices can be linked to multiple destinations over the same circuits.

Covia Corp., which is in the process of installing Stratacom's first-generation IPX switches, is "looking at the frame relay system in the future" but has no immediate plans to use the device, according to Covia network tactical planning manager Richard Scholl.

Broader industry support of the Frame Relay standard would influence Covia's decision to migrate to the newer system, he said.

The Second Generation IPX interface card, priced at approximately $10,000, supports up to four V.35 interfaces with a combined throughput of 1.5M bit/sec. Scheduled to be available in the second quarter, the card is also said to support fractional T1 connections.

The card will interface with Telenet Communications Corp. TP4 packet switches by the third quarter and Digital Equipment Corp. Decrouters by year's end, Owen said. Subsequent releases will support the Integrated Services Digital Network Primary Rate Interface, Owen said.

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VITALINK
COMMUNICATIONS CORPORATION

Openview

FROM PAGE 67

ment. The vendor is still struggling to cram both New Wave and Openview network management functionality on the same Unix system, Mahler said.

- Full compliance with Open Systems Interconnect-based network management protocols by early 1991. The current version supports Simple Network Management Protocol (SNMP) and Common Management Information Protocol Over TCP/IP.

HP also announced that SNMP has been implemented on the workstations of its Apollo division, enabling such systems to be managed via Openview.

In addition, HP will have to make good on its claim to have resolved the problems inherent in a distributed network management system, said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C.

Those problems include managing updates and other interactions among distributed servers and databases to minimize network traffic and connection costs as well as making sure the system can recover when a crucial element crashes.

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Digital's Network Application Support (NAS) lets you integrate applications and share information across your multivendor environment.

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NAS. Why it works.

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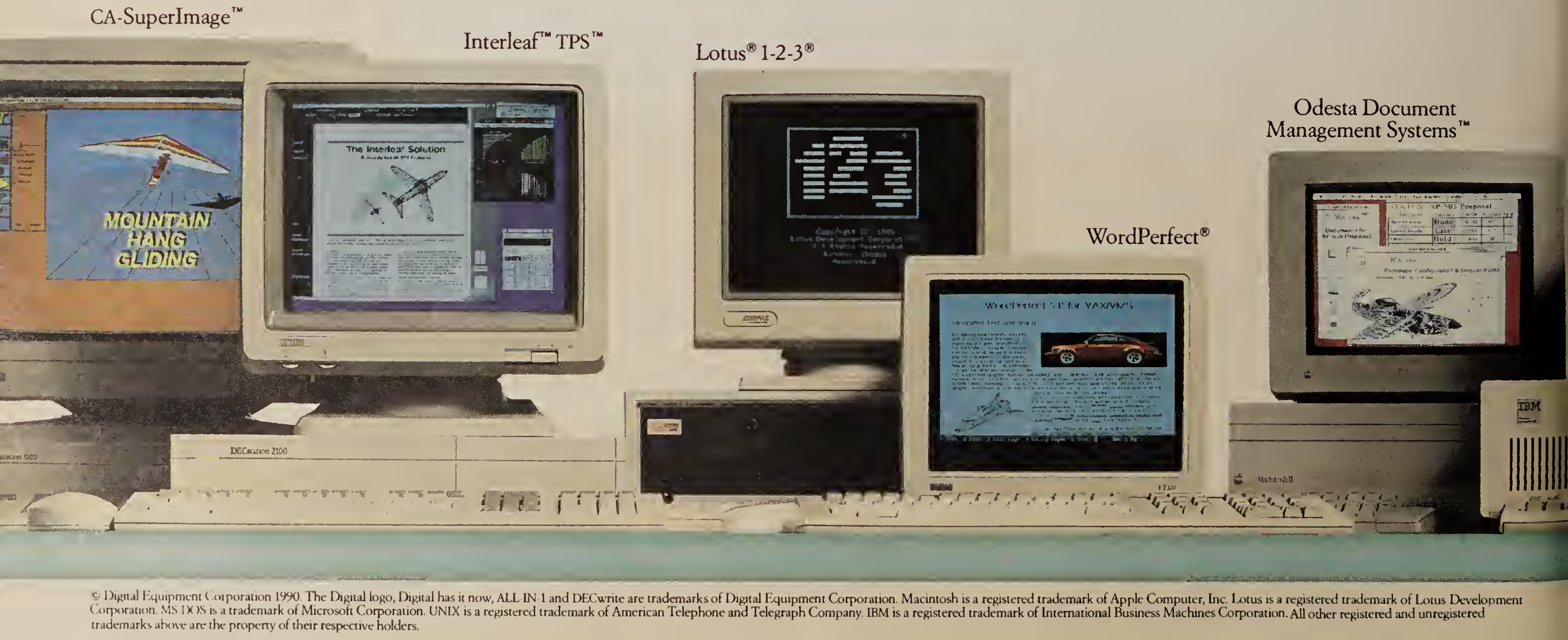

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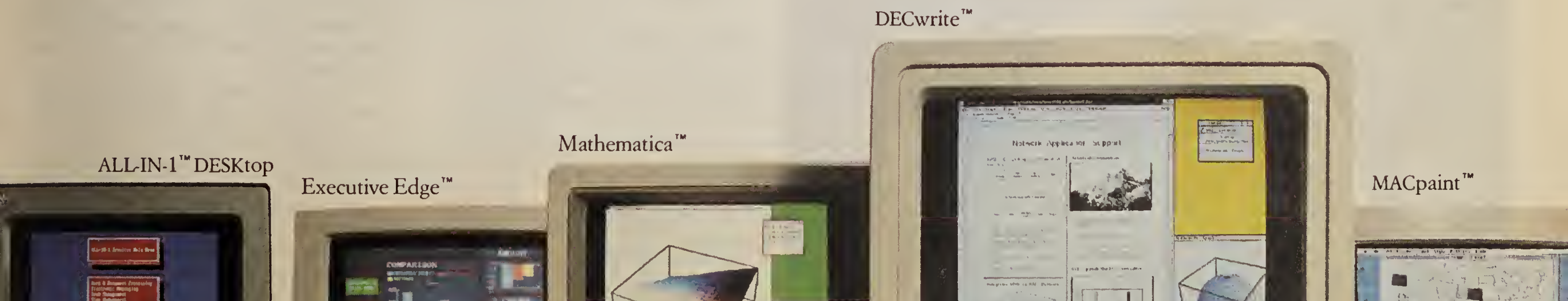

Fractional T1 wins commitments

BY ELLIS BOOKER
CW STAFF

Two T1 multiplexer vendors last week introduced products to support voice and data over fractional T1 lines. Fractional T1 technology is said to provide users with cost savings by enabling them to route multiple 56K or 64K bit/sec. lines as a single channel, instead of having to pay for either individual 56K bit/sec. links or entire 1.5M bit/sec. connections.

Network Equipment Technologies, Inc. (NET) in Redwood City, Calif., added a component, the FT1 Access Intelligent DSU/CSU, to support fractional T1 through its IDNX family of multiplexers.

Meanwhile, Republic Telecom Systems in Boulder, Colo., said its new RNET transmission system supports data and low-bandwidth voice traffic on fractional T1 lines.

The NET unit, a private label version of Sunnyvale, Calif.-based Cylink Corp.'s 4202 FT1 ACSU, is said to support multiple 64K bit/sec. connections over an NET IDNX switch.

The NET unit is also said to support both AT&T's and Northern Telecom, Inc.'s schemes for allocating fractional T1 bandwidth on their central office switches, which would allow the multiplexer to interface with carriers' fractional T1 services.

The NET product ranges in price from $4,500 to $8,500, depending on configuration, and is available immediately.

Centralized control

A network management system developed by Cylink offers FT1 Access users centralized control via an IBM Personal Computer or Personal System/2. The management product will be integrated with NET's own Model 3050 Enhanced Operator Console Plus network management system this year, NET said.

Republic Telecom's fractional T1 product includes three systems: a packet switch and call processing system, nodal multiplexers connected via digital circuits ranging from 19.2K to 128K bit/sec., and a Xenix-based network management system running on an Intel Corp. 80386-based personal computer.

Republic said it has incorporated into the product its own patented RLX voice-packetizing technology, which the company claims can provide up to 10 voice channels on a single 64K bit/sec. circuit.

Prices for the RNET system, which is available immediately, include the RNET switch at $45,00 to $85,000, the network control package at $22,500 to 33,750, and the nodes at $14,000 to $35,000, depending on network size and configuration.

Upgrades are available for existing, point-to-point RLX system users, Republic said.

CNT tool opens door to network management

BY JOANIE M. WEXLER
CW STAFF

Network managers using Computer Network Technology Corp.'s Channelink channel extenders should soon be able to use their favorite high-level network management system to receive management data from the devices — without needing a separate interface to do so.

Channel extenders link host channels directly to long-distance connections, providing high-speed interaction with peripherals or hosts at remote sites.

CNT recently introduced its Network Curator Version 3 (NCV3) network management software, which it plans to demonstrate this week at the Communication Networks '90 show in Washington, D.C. Implemented in a Channelink network, the software will reportedly interface to common industry network management protocols, including IBM's Netview, AT&T's Unified Network Management Architecture, Sun Microsystems, Inc.'s Sunnet Manager, Simplified Network Management Protocol and Open Systems Interconnect-based network management protocols.

These high-level network management systems receive filtered data from the lower-layer processes in a communications system to give managers an overall view of the network. Embracing the common interface protocols being implemented in complex networks will eliminate the need for a separate network management interface, the company said.

The software will reportedly be released in phases, with the Netview interface slated for release early this year. Additional interfaces will be added on an ongoing basis, according to the vendor.

To extend the reach of applications previously limited by geographic distances, the company has also announced that its Channelink products will support DS3 communications lines during first-quarter 1990 and will support 100M bit/sec. fiber-optic links and the European G.703 standard during the second quarter of this year.

License fees for NCV3, which includes host-based code, will range between $15,000 and $20,000 and will be determined on a per-host basis.

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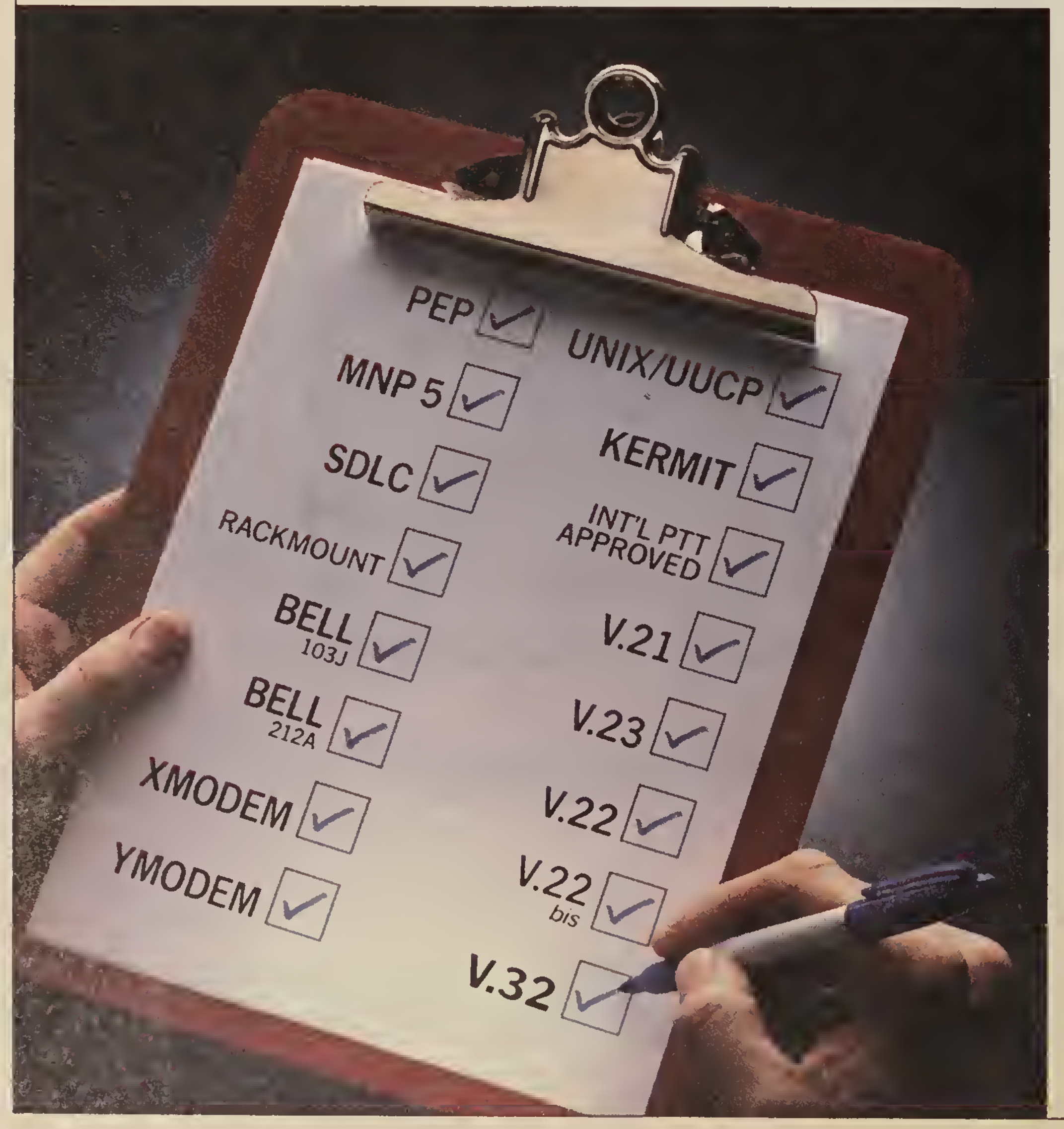

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ISDN enters USAA, Texas-style

ON SITE

BY ALAN J. RYAN
CW STAFF

SAN ANTONIO, Texas — In the Lone Star State, where everything they do is *big*, one of the nation's largest insurance and financial services companies is laying the groundwork to bring Integrated Services Digital Network (ISDN) access to its two million members/policyholders through the existing public telephone system.

The ambitious project is still in its infancy: USAA recently completed a field test that verified the interconnectivity of previously incompatible telecommunications switching equipment utilizing ISDN communications standards.

USAA's objective is to use AT&T's ISDN networking service to interconnect its Intecom, Inc. IBX private branch exchange systems with a Northern Telecom, Inc. Meridian SL-100 switch at its home office.

"Once we do that, it would be a very cost-effective internal network for USAA for both voice and data and would give us [the] ability to mix and match NTI and Intecom equipment without having to worry about compatibility between different manufacturers' systems," said Jack Hamley, manager of technical and operational support at USAA. Both vendors' switches will be equipped with the ISDN Primary Rate Interface (PRI), which can handle up to 23 64K bit/sec. connections.

In the earlier first phase of the ISDN project, completed last May, USAA's SL-100 was linked to an AT&T #4ESS switch, which supports the carrier's ISDN access services. The second phase of the ISDN trial involved testing interoperability between the #4ESS and an Intecom IBX equipped with an ISDN PRI board.

During the test, a call was made through an AT&T WATS Megacom 800 line from Intecom's home office in Allen, Texas, to an IBM system at USAA in San Antonio, said Joe Goldman, senior product manager for ISDN at Intecom.

"On the phone that we called, we displayed the calling party ID prior to the call actually being answered," Goldman said. "The AT&T network identified that we were calling, gave our number to the network in Allen, passed it through the #4ESS to the IBM machine and that machine displayed the number on the phone prior to it being answered," he said.

ISDN-formative

That information provided over the ISDN connection could be utilized in many ways, Goldman added. One use, shown during the test, was to bring the caller's ID number into a personal computer and call up a file associated with the caller's ID.

"The unfortunate part of the evolution of ISDN is that there are standards, but they are not universal," Goldman said. "The #4ESS is a little different than other products or other manufacturers' PRIs. This was an opportunity to test [it] in a live environment to make sure we could connect properly to the #4ESS."

Because the Intecom card used in the test was a prototype, USAA is awaiting its release sometime later this year. In the meantime, the company has been putting everything else in place to utilize the hardware for its internal network. However, the planning does not stop there.

"I have hired an analyst to specifically work with our users to develop business applications with ISDN as the technology becomes available," Hamley said.

USAA has been an early user of image technology, and Hamley said the analyst will poll the company's users to see if there are any potential applications utilizing image and ISDN.

Probably the greatest early-on potential Hamley sees for ISDN is what was demonstrated during the test: "the interface of the calling number identification with the customer database we have on the IBM mainframe." USAA is active in the promotion of ISDN standards, including a switch-to-host applications interface proposed by Northern Telecom, he said.

USAA is made up of 54 subsidiaries and affiliates and owns and manages $15.4 billion in assets. The company handles 50,000 to 60,000 member calls daily.

ISDN

FROM PAGE 67

According to Bruce Meadows, telecommunications consultant at Union Pacific, the numbers of the lost callers are then matched with customer records. If the number shows that a major customer was calling, managers can call back and find out what the customer wanted — before they give their business to a competitor.

When Union Pacific began using automatic number identification in late 1988, agents answered the calls with a personalized greeting. However, Meadows said that practice was abandoned because agents were spending the first four to six minutes of the call explaining how they knew the caller's name.

"There are currently some legal and ethical questions concerning the use of ISDN's [automatic number identification] such as the question of whether end users should be able to suppress [automatic number identification] in order to remain anonymous when making a phone call," said The Yankee Group.

Already privacy advocates are fighting a similar service, called Caller ID, which is being offered by some local telephone companies for residential and small business customers. Caller ID transmits the caller's phone number to a small electronic display attached to the receiving phone, thus allowing a person to ignore calls from certain numbers.

The public backlash against Caller ID could affect the use of automatic number identification in corporate settings, if it generates broader government response such as court challenges or congressional actions restricting automatic identification, according to Berge Ayvazian, vice-president of The Yankee Group.

Privacy advocates such as the American Civil Liberties Union have argued that Caller ID is an invasion of privacy, especially for people such as battered spouses who do not want their phone numbers disclosed. Critics want consumers to be able to block Caller ID so their phone numbers are not displayed.

Bell Atlantic Corp. and Bellsouth Corp., on the other hand, have opposed consumer blocking on the grounds that it dilutes the value of Caller ID service. Furthermore, they argued that Caller ID actually enhances privacy because it allows consumers to block intrusive and obscene calls.

Caller ID hang-ups

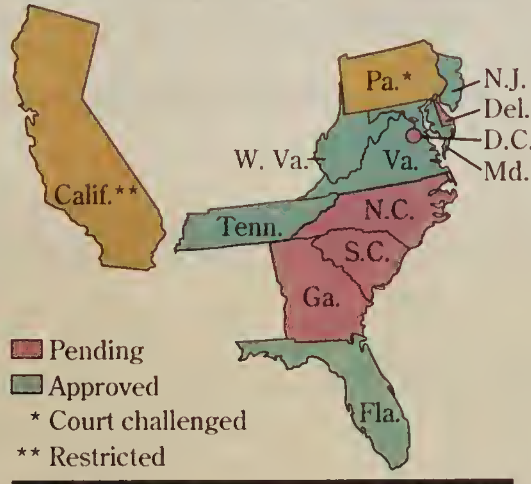
In some states, Caller ID was approved with little discussion. However, a consumer lawsuit in Pennsylvania has temporarily blocked Caller ID there, and a new California law gives callers the right to suppress Caller ID (see graphic).

"This is the opening round of a much bigger battle about the control of personal information," said Gary T. Marx, professor of sociology at MIT. Marx, who opposes Caller ID unless consumers can block it, said he expects congressional hearings on the issue.

However, he said the privacy argument against caller number identification may be less potent in the case of calls to an 800 line, which is the equivalent of a collect call. As one automatic number identification user put it: "If you call our 800 number, then you forego the right of privacy, because we are paying for the call."

Call waiting

Only eight states have approved caller identification tariffs, with two of those currently subjected to a court challenge or restriction



SOURCE: CW CHART

CW CHART: MARIE HAINES

Booker

FROM PAGE 67

ing to believe that human misery sometimes strikes randomly, without the aid of human hands.

Defending his company, AT&T Chairman Robert Allen rightly said that the outage was unprecedented in his 32½ years in the industry. True enough. But Mr. Allen neglected to point out how radically the telecommunications industry has changed in the past 30 years — even the last 10 years — and what these technical and market conditions imply.

Take U.S. telecommunications networks' worldwide reputation for reliability and stability. This reputation is deserved — ask anyone who travels abroad — and yet it is largely a legacy dating to the predivestiture Bell System.

Prior to the landmark judgment dismantling Ma Bell in 1984, a single monopoly provided long-distance and local service.

In addition, the old Bell System was world-famous (infamous among some vendors) for its testing procedures. Indeed, one of the arguments in favor of divestiture was that Ma Bell's rules for deploying technology were too slow, too methodical and actually stymied innovation and closed out new suppliers of networking gear.

The technology itself was simpler, too. Unlike the computers that drive the network today, much of the network was based on simpler electromechanical or stored-program-control switches. But as others have pointed out already, the welcome advances in "fault-tolerant" hardware have not been matched by parallel advances in software.

Finally, services were simpler. Who would have predicted virtual private networking, credit card authorization or network-based voice messaging a dozen years ago? These services are one battleground for the fierce competition for customers among local-exchange and long-distance companies. As these services are rolled out faster and faster, new opportunities for unexpected interactions increase.

What does this mean for users? As a practical matter, the AT&T outage only underscored the earlier lesson learned from the Hinsdale, Ill., central office fire. That is, smart network managers avoid a single point of failure. Prepare for the unlikely and you're likely to be safe. (AT&T's competitors, who sought to gain advantage from AT&T's misfortune last month, take note.)

Users ought to be more concerned over the apparent lack of top-level coordination among carriers demonstrated by the AT&T outage last month. The federal government does have such an agency, in the form of the National Security Telecommunications Advisory Committee (NSTAC). The presidential advisory group includes representatives from about 30 manufacturers and providers of telecommunications products. However, the group deals only with issues affecting the federal government, and there are no user representatives in NSTAC.

Pressuring the carriers to move beyond their narrow interests and cooperate for greater reliability will be tough. For example, AT&T now says its operators will provide the access codes of competitors in times of outages on its network. But, on the other hand, the company was denying reports that it had approached its competitors with formal interconnection agreements in the event of service disruptions.

Understandably, these companies are exceedingly reluctant to acknowledge the existence of their competitors, much less work with them to provide customer solutions. To do so, they feel, is to risk the implication that their own networks are not invulnerable. But any unblinking analyst knows every network is vulnerable.

Booker is *Computerworld's* Chicago correspondent.

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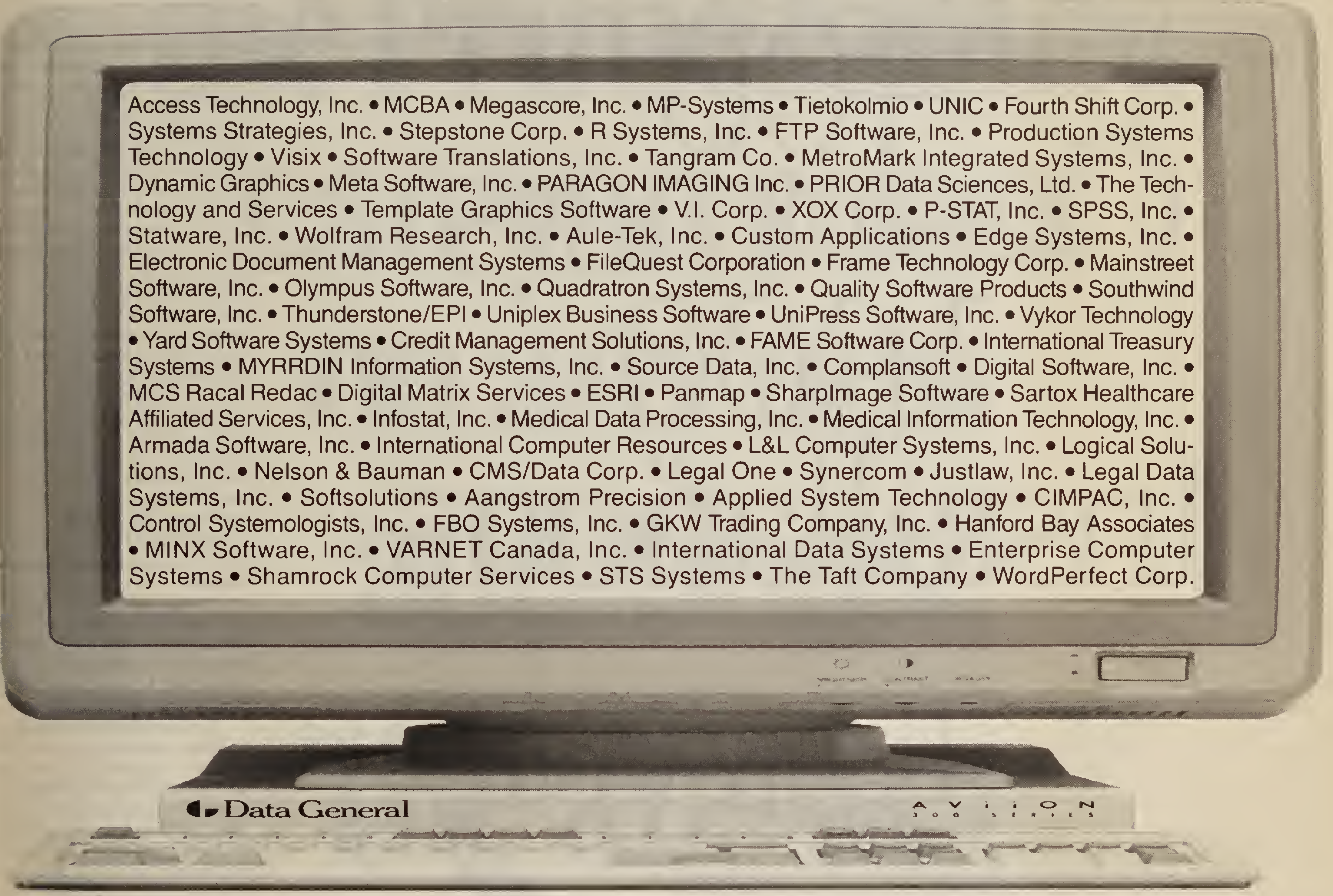

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NEW PRODUCTS

Local-area networking hardware

Fibermux Corp. has announced a Token-Ring fiber-optic repeater that extends the transmission distance between any 4M- or 16M-bit/sec. IBM Token-Ring Medium Access Unit to five kilometers.

The FX182T-16 repeater supports industry-standard token rings. Fiber interface options can transmit data at 850 or 1300 nanometers through single or multimode fiber, with up to 30 decibels of optical power loss.

Prices range from $1,750 to $3,650 per repeater.

Fibermux
9310 Topanga Canyon Blvd.
Chatsworth, Calif. 91311
818-709-1556

Local-area networking software

The Tops Division of Sun Microsystems, Inc. has introduced the Network Bundle for DOS and the Network Bundle for Apple Computer, Inc. Macintosh. Both products were developed to combine new versions of the Tops file-sharing system with the Inbox 3.0 electronic mail system.

The Network Bundle for DOS includes Tops 3.0 file-sharing software (which can be configured in 65K bytes) and Inbox 3.0. It is scheduled for shipment in February and will cost $249.

The Network Bundle for Macintosh offers Tops 3.0 as well as Inbox 3.0 with Macintosh administration software and printing services. It is currently available at a suggested retail price of $299.

Tops
950 Marina Village Pkwy.
Alameda, Calif. 94501
415-769-9669

The Haven Corp. has announced a multiuser version of its Mail Order Wizard personal computer-based order processing and catalog management system. The Multiuser Wizard operates on any MS-DOS IBM Netbios local-area network, allowing an unlimited number of operators to enter orders simultaneously.

The menu-driven product was created for mail-order catalog or inbound telemarketing companies, according to the vendor. It processes incoming orders and prints customizable forms, maintains a mail list of up to 260,000 names, fills back orders and generates past-due notices automatically.

The price is $5,000, and a demonstration disk is available for $20.

The Haven Corp.
802 Madison St.
Evanston, Ill. 60202
708-869-3434

Links

Network Technologies, Inc. has announced an eight-port switch designed to allow up to eight computers to be attached to a single keyboard and monitor.

The SE-5D9D-8 switch is a remote-control unit that can be used with clusters of file servers and is compatible with IBM's Enhance Graphics Adapter, Color Graphics Adapter, monochrome video boards and PC AT-style keyboards. It costs $1,360.

Network Technologies
19145 Elizabeth St.
Aurora, Ohio 44202
216-543-1646

Teleray's Model 30 Multi-Session Color Graphics Terminal has been enhanced to provide four serial ports for accessing four separate hosts or applications simultaneously.

The product is compatible with the Digital Equipment Corp. VT340, Tektronix, Inc. 4105 and Bull H. N. Information Systems, Inc. VIP protocols. A proprietary screen manager enables display of multiple data sources in session windows for concurrent viewing.

The $1,995 terminal has been designed for a control-console environment.

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MANAGER'S JOURNAL

A jovial pied piper of persuasion

Price Waterhouse's Laube stays on exploration path in management, technology

BY PATRICIA KEEFE
CW STAFF

PROFILE: Sheldon Laube

John Martini

Position: *National director of information and technology, Price Waterhouse*
Mission: *Centralizing IS focus while decentralizing technical initiatives to local branches*

Seated across the desk in an office studded with palm trees, Sheldon Laube beams. It is hard not to like the gregarious, articulate Laube, who clearly likes people — just as much as he likes technology.

His ideas on managing both — using technology to change, not just automate, business procedures — have landed him in the newly created catbird seat as the chief information executive at Price Waterhouse.

Laube was appointed national director of information and technology in December by the auditing and consulting firm [CW, Dec. 11, 1989], which created the position at his suggestion before tossing the ball back into his corner with a job offer. Little wonder that co-workers frequently mention his powers of persuasion.

"I perceive a new excitement in the firm now. We are on the verge of really making technology pay off for us in mission-critical-type applications," says David Hodgson, a partner at the firm's Audit Research and Technology Group.

Laube's softly colored office is adorned with a huge Merlin the Magician hat and various replicas of palm trees, including what looks like a cloth escapee from the Garden of Eden — snake and all. In this midtown Manhattan setting, Laube will be making some hard decisons over the next year about technology, and hence the future of Price Waterhouse.

However, unlike many of his compatriots at other firms, Laube's toughest job will be devising, not selling, his plans. Like any other manager, he will have to defend his strategies before the executive board.

But Laube already has two points in his favor. First, he sits on the board, which he said views technology as a key factor for the firm's success in the 1990s.

"Management felt that we were not capitalizing on changes in technology or how [best] to utilize technology in serving clients," Laube says.

They asked Laube, a relative newcomer to the IS staff who was heading up a research team, to go out in the field and report back with recommendations on how to sharpen the corporate focus on technology as a competitive tool.

In the end, Laube spent five weeks on the road talking to some 60 staffers. What he learned boiled down to this: Provide a centralized point for information systems decision-making, but decentralize technical knowledge to consultants in the branch. The idea was to provide a focal point for techni-

Continued on page 86

The computer as job seekers' truth serum

BY MITCH BETTS
CW STAFF

Apparently, you don't lie to a computer. According to researchers at the Georgia Institute of Technology in Atlanta, job seekers who are interviewed by a computer are more honest about their qualifications than applicants questioned in traditional face-to-face interviews.

However, the research also found that applicants for management-level positions expect to meet with human interviewers and may resent being interviewed by a computer instead, according to Dr. Dennis Nagao at Georgia Tech's College of Management.

The research, believed to be the first to examine the validity of computerized job interviewing, was conducted by Nagao and Dr. Christopher Martin of Louisiana State University. They measured honesty among student volunteers asked about their grades and Scholastic Aptitude Test scores during a mock job interview.

"We got a lot of exaggeration, but the exaggeration was much stronger in face-to-face situations than in the computerized or paper-and-pencil situations," Nagao explained.

HELLO...
PLEASE SIT
DOWN......
David Flaherty

Experts say that good hiring decisions are often hampered by "socially desirable responding," in which applicants tell interviewers what they believe the interviewers will want to hear.

Computerized interviewing may reduce that problem by removing much of the social pressure "to make a good impression" in a face-to-face interview, Nagao said. Also, computer interviewing probably introduces what Nagao called the "Big Brother Effect."

"There is a sense that the computer may be tied into an overall computing system and that there might be an instantaneous check of the information," he said. "Most people do not want to be in a situation of being caught in a lie."

But there are limits to the technology. People interviewing for management jobs "expect to merit a personal, face-to-face interview" and may resent it if they don't get one, Nagao explained. He urged fims to be careful when replacing interviewers with computers: "If applicants are resentful of the interview, that could hurt the company's recruiting efforts and keep them from hiring the best candidates."

EXECUTIVE TRACK

John L. Diesem has been appointed senior vice-president of systems technology at the **American Stock Exchange** in New York.

As head of the exchange's Systems Technology Division, Diesem is responsible for the planning, design and implementation of systems to support trading activities. He reports to William Strauss, executive vice-president, administration and finance.

Diesem joins the exchange from KPMG Peat Marwick, where he was director of strategic systems planning. He was previously vice-president and director of business systems development at McGraw-Hill, Inc. and has worked at Touche Ross & Co., Arthur Andersen & Co. and Electronic Data Systems Corp. Diesem holds a bachelor's degree in economics and a master's degree in data processing and government from George Washington University.

....

John L. Wedick Jr. announced his retirement as deputy commissioner for planning and resources at the **Internal Revenue Service** in Washington, D.C.

As deputy commissioner for two years, Wedick was involved in programs to promote electronic tax return filing and artifical intelligence technology.

During his 31-year IRS career, Wedick received the Distinguished Presidential Rank Award in 1988 and the Meritorious Presidential Rank Award in 1986.

....

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Clinton Wilder

Fear of the "O" word

Eastman Kodak, the company whose name has become most closely associated with the trend toward outsourcing, doesn't like the word.

At a recent Nolan, Norton one-day conference on outsourcing held in Chicago, Henry Pfendt, Kodak's director of corporate information systems, began his presentation by explaining "why we don't like the word outsourcing per se." Instead, Kodak prefers to refer to its pioneering data center, telecommunications and personal computer management contracts as "partnerships" or "strategic alliances."

In political terms, this is known as distancing yourself from the issue.

Many Fortune 500 firms, including Heinz, American Standard, Copperweld, Foodmaker and Dial, don't seem to have any problem with the term. At conferences or in these pages, their IS executives stand by their decisions to outsource pieces of their IS operations, citing financial and strategic benefits. And they have not sailed the outsourcing waters as far from shore as Kodak plans go.

By eventually reducing its in-house IS staff from 2,000 people to less than 150 — and transferring hundreds of employees to new companies — Kodak is doing more outsourcing than anyone. A Yankee Group conference on the issue later this month is titled, "Outsourcing — The Kodak Effect." So why does Kodak want to call it something else?

The company doth protest too much, methinks.

Yes, Kodak's management contracts fundamentally change the traditional roles of vendor and user in a company's information infrastructure. Normally, the vendor company supplies products or services, and the user company manages them. At Kodak, management of everything in IS, not just data center operations, is or will be in partnership with a vendor — IBM, DEC, Businessland and whomever Kodak chooses this year to work with on applications development.

OK, I used that word: partnership. But I don't like what it implies or the reality that it appears to gloss over. I know that IBM, DEC, Andersen Consulting and scores of smaller players are offering more kinds of IS services than ever before. I truly do believe that IBM, in particular, is moving from a sell-more-boxes company to a full-service provider.

However, IBM is in business for one reason and one reason alone: profits. It damn well better be, or it would face a shareholder suit like you've never seen.

Obviously, it is in IBM's best interests for Kodak to be happy with the relationship, and Big Blue, like most U.S. companies, is beginning to rediscover the importance of customer service. However, whose interest truly comes first?

This whole issue reminds me of the current Isuzu television commercials in which a gullible customer, about to buy a Toyota truck, is talked out of it by an Isuzu salesman lurking in the bushes. After the customer is sold on Isuzu's roomier cargo space and all the rest, he gushes, "I sure am lucky that I ran into you." Then the salesman pulls off a mask to reveal he is none other than Joe Isuzu and says with his infamous smirk, "We-e-ell, I wouldn't call it *luck.*"

And I wouldn't call a vendor contract a partnership or alliance. As another example, let's say my house needs repainting. I could do it myself, but I want to focus my time and energy on the strategic goal of advancing my journalism career.

So I opt for outsourcing — I hire a house painter. It's more than menial labor — as part of the contract, I get his technology expertise on color and paint type. I suppose I could call him my partner in a strategic alliance for home improvement to enhance the competitiveness of my house when I put it on the market.

But I don't. He provides a service and gets paid for it. He's a vendor.

For IBM and DEC, managing Kodak's IS and telecom operations is a fantastic business opportunity. For Kodak, it is a chance to make badly needed cost cuts and leverage its information resources in a revolutionary new way. It could be a path that helps restore Kodak's global competitiveness and become a model for other companies' IS functions; we won't know that for a while. But it *is* outsourcing — in a big way.

Raymond F. Connor, an independent consultant and former General Electric IS executive, articulated it well on the panel he shared with Pfendt at the Nolan, Norton conference. "I hear the words about partnership," Connor said, "but fundamentally, the vendor is interested in making money, and your interests are different. At some point, those interests will diverge."

Nothing wrong with that; it's just the reality of the marketplace. But let's not kid ourselves about what motivates each side that signs the contract. If that's understood, there shouldn't be anything wrong with saying the "O" word.

Wilder is *Computerworld*'s senior editor, management.

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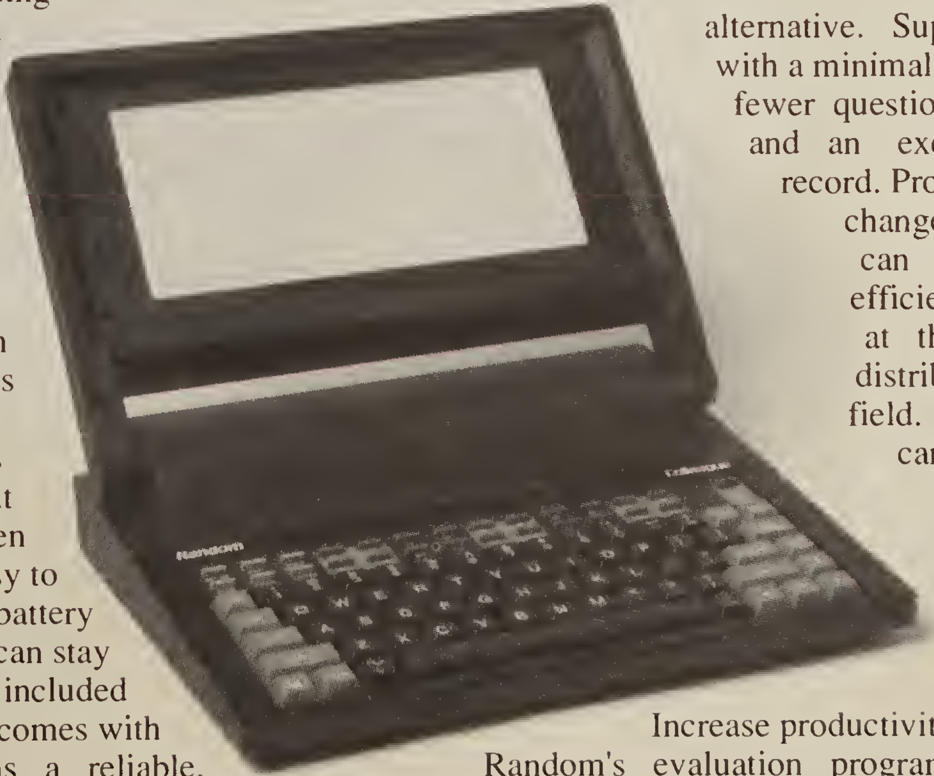

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Pied piper

CONTINUED FROM PAGE 81

cal support and standard-setting while simultaneously encourage the typically non-technical workers in the trenches to apply technology to problem-solving.

Laube was tapped in part because of his ability to explain technical issues to nontechnical managers. "Technical people tend to put up a cloud to avoid business issues because they don't understand business strategy," Laube says. "To me, there are no technical problems. When you present a plan to business, you talk business."

Also in his favor, Laube has a solid grounding in business, thanks in part to two entrepreneurial ventures over the years — one of which, Consumer Financial Institute, he sold to Price Waterhouse.

Company officials are dead serious about the link between business goals and technology, according to Hodgson.

"To take a guy like Sheldon, who could generate significant revenues in a client service mode, and put him in a staff management-type role is a big investment to make," Hodgson points out. "Management is not fooling around [with this appointment]."

Laube, too, has never been one to fool around about pursuing his goals. While a student at the Bronx High School of Science in 1967, the 16-year-old Laube was wild about biology. But a visit to a job fair opened his eyes to the possibility of combining his love of biology with engineering, an area he was somewhat attracted to.

"I thought, 'Eureka! Biology and engineering in one job.' I was all set," Laube recalls.

Not quite, as it turned out.

At the time, Bronx Science was one of the few high schools in the country with an IBM 1620, but it was available only to students in advanced technical courses. Laube missed that boat after registering a 75 on a prerequisite course.

After taking some ribbing from a buddy in that class, Laube bet that given the text, he could teach himself in two weeks what his friend had learned after attending class for four months.

"So at lunch, when the teacher was gone, he'd let me into the computer room to run my programs," Laube says. He also discovered that New York University was running an open computer lab on Saturdays. Soon, he was running jobs through the university's IBM 3630. "I was hooked — and I also won the bet," he says.

His appetite for hands-on experience played a role in determining his choice of college. The prospect of waiting with his nose pressed up against the glassed-in data center until he became a graduate student was not appealing.

Case is the place

Laube had expected to attend college in New York but did send an application to Case Institute of Technology's biomedical engineering program in Cleveland.

By chance, Case happened to have one of the very few open computer centers in an era when mountainous mainframes were safely sequestered behind locked doors, far from the unwashed undergraduates.

"Students got to feed their own cards in the computer and mount their own tapes," Laube says.

This was practically unheard of. "I thought, '*This* is the place to learn about computers,' " he says.

Case was also the place where Laube learned about management of technology and information professionals. He created a programming and consulting services firm that not only provided students with paying jobs but served as an educational laboratory functioning under the protective wing of the college. The firm served campus-based clients.

"I learned more about business running that company," Laube says. He also embarked upon a career-long study of the interplay between the management of technology and people, issues he said were not being addressed in college curricula at the time.

He used what he said is one of the few "undesignated" bachelors of science ever awarded to fashion a program of study in management and technology. Twenty years later, he is still exploring those issues.

Already, Laube is garnering plaudits for his efforts in focusing the investment money available for technology in ways that make sense for the firm as a whole. Previously, the firm was more apt to spend small amounts of money in many different places in ways that had no synergy, Hodgson observes.

Laube recently gave a presentation on the need to establish technology standards to the annual meeting of the roughly 1,000 partners in the firm.

"Afterwards, I spoke with an older partner who told me that [my speech] was the first time in 25 years that he had heard the partners happy that the national office was telling them what to do," he recalls.

Although guidelines for standards will be set centrally, Laube is hoping that some of the direction for innovation will come from the trenches.

"Most automation is used to automate the same old task you did before, without stopping to think that maybe the task could be done differently. Most processes are built historically on what was done in the past with no appreciation for the technology sitting on the desk," Laube says. "If all you do is do what has been done, how can you radicalize what you are doing?"

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Plenty of Notes

Price Waterhouse's gargantuan purchase of 10,000 copies of Lotus Development Corp.'s Notes groupware package has made the headlines, but it's the way Notes will be used at the financial services firm that provides an excellent example of Sheldon Laube's IS philosophy for the firm.

To ensure that Notes will become a corporatewide tool for electronic problem-solving, Laube has decreed that all branches will be networked within two years.

Recognizing that decentralization of technology takes a number of forms, he has also moved to set standards guidelines — a decision that some technical managers greeted with a sigh of relief.

Already, Lotus 1-2-3 WK1 files, Wordperfect Corp.'s word processor and Novell, Inc.'s Netware, along with IBM's 4M bit/sec. Token-Ring, have emerged as Price Waterhouse standards and may soon be followed by Systempro servers from Compaq Computer Corp.

"I agree with his logic — let's get things coordinated. It would sure make my life easier," says Nancy White, a technical coordinator at Price Waterhouse's Washington, D.C.-based National Tax Service, where 35 networked PCs are already sharing Notes files (see story page 63).

Standardization is "long overdue," agrees James Holloway, a senior technical specialist at the company's National Information and Technology Center in Tampa, Fla. "Every company spends a lot of money on computer equipment, but if you do it with some direction, you might get somewhere."

To get users up and running, Laube has put together a series of expert shells and a help desk on Notes to facilitate technical initiatives and interchanges.

"We don't want people trying to solve problems without guidance as to what is the right technology, or without a base level of training," he says.

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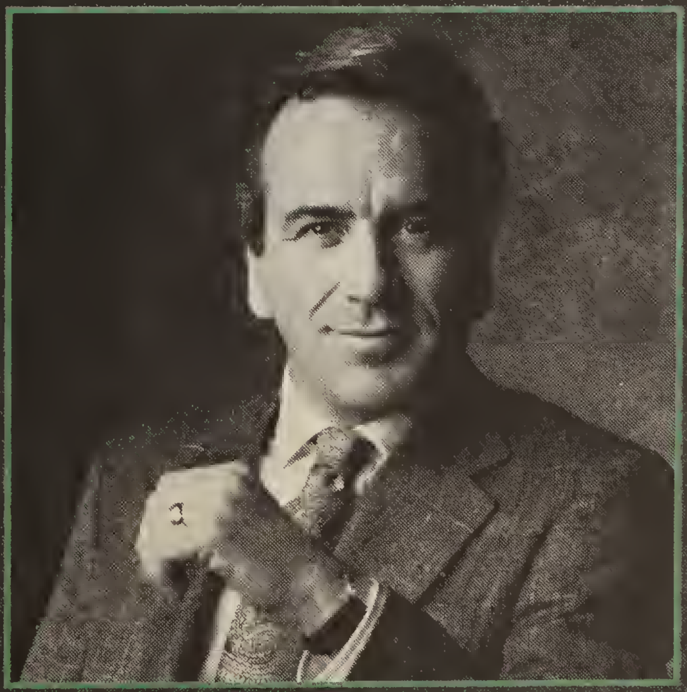

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BOOK REVIEW

Sex, greed and Soviet espionage come to a fictional Silicon Valley

THE TITAN GAME
By Niven Busch
Random House, $17.95

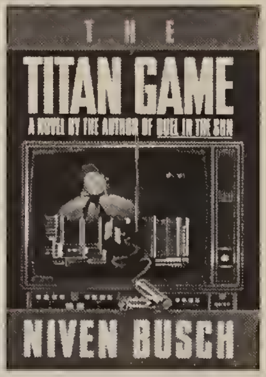
If you liked *The Bonfire of the Vanities* because of its wholly real greed and backstabbing business environment, *The Titan Game* will hit even closer to home.

Set in the politically high-powered, high-tech arena of Silicon Valley, the novel sweeps the reader into an entirely plausible yet slightly futuristic business world.

One computer company, Adect, has jumped into weapons manufacturing in a postnuclear, but not post-Cold War, age. Adect manufactures deadly little robots to replace humans in combat.

This is what the computer company of the future has come to. The world is saturated with CPUs. The intellectual power that has taken technology to its limits in commercial and personal use has been rechanneled to military playthings. It is as if the society has become all head and no body, relying on computers for dangerous and inane work. But the head is forgetting that, as a fallible human head, it is incapable of creating the perfect being.

The protagonist's father and his three attack dogs are killed by one of these little military mechanical pseudosoldiers. This does not go unnoticed, as the protagonist's father is a honcho, somewhere along the lines of a David Packard or John Sculley. The president and the Joint Chiefs of Staff, as well as foreign leaders, would rather blame circuitous CIA reasoning for the death, rather than believe the simple and politically ruinous explanation given by the protagonist, who reluctantly takes over his father's business.



The politicos want to rely on the purity of computers. They are set to believe that the yes/no logic programmed into them keeps them from "thinking" on their own. It is never clear that the robots actually "think" — that would be a different genre of fiction. This is not science fiction; it is business fiction.

While the plot revolves around high-ranking politicians — both corrupt and otherwise — and the business of the Silicon Valley, there is plenty of sex to keep the nontechnical and nonbusiness reader interested.

The author, Niven Busch, has neither a high-tech nor a business background. He became interested in Silicon Valley intrigue after watching the Soviet consulate across the street from his San Francisco home. For years he saw unmarked trucks moving in and out at all hours. Later he was told that those trucks were full of electronic listening equipment, and their mission was to pull up to high-tech firms and listen for their secrets.

Reportedly, those missions picked up more office gossip and aerobics lessons than technical insights. They still launched Busch into high-tech research.

His research paid off. Descriptions like the following reveal insight behind the Silicon Valley gloss: "There was thievery, schlockery, adultery, fraud and general sleaziness — not killing. There was no need for it. Killing was for city ghettos. Here, billions of dollars washed daily through the quiet streets. If you wanted some you just dipped in. The currency was chips, and the great factories oozed chips like glucose from an IV bottle. A junkie security guard on a loading platform could get you some."

Busch's prose does get unnecessarily thick on occasion, but the book doesn't read like it's overstuffed. He also salts the book with small observances that fit Silicon Valley life perfectly. He mentions the Grateful Dead, six-day work weeks, reverse engineering and even street names in Cupertino and Palo Alto.

While well-written and generally a great novel to get caught up in, its drawback is in the stereotypical characters — primarily women — who were only in the plot for sex or as minor companions to other characters.

The most stereotypical was a Russian defector at work for Adect. Little about this character rings true in the *glasnost* era. Busch may be a Cold Warrior at heart, or maybe he needed the specter of the Evil Empire to set tension for the story. Or perhaps Busch is just feuding with his Russian consulate neighbors.

J. A. SAVAGE

Savage is a *Computerworld* West Coast correspondent.

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PRODUCT SPOTLIGHT

TOOLS FOR LARGE NETWORKS

The search is on

BY MARY RYAN GARCIA

At Metropolitan Life Insurance Co., 1,500 business offices want to establish direct links to one another — and they don't want to burden the backbone SNA network that links them to the New York insurance giant's four computer centers.

In 10 years, most of the processing that takes place on the mainframe will move to personal computers in the remote offices, and office-to-office communications will take place entirely on local-area networks. Dependence on the mainframe, which today is the lifeblood of processing, will consist of file updating, shared processing, electronic mail and accounting applications.

It's not just at Met Life that the shape of the corporate network is changing. Managers are taking hold of their networking operations with renewed vigor, flattening their hierarchical corporate networks to make them more peer-to-peer.

First, however, these managers have to pack their duffel bags with some sturdy tools. The sometimes unwieldy combination of vendor equipment, protocols and bandwidths can mean a rough taming job, especially when it comes to such issues as differing protocols, connectivity, management, voice/data integration and, yes, even ego wars.

This isn't an easy task, according to Steve Bortnyk, manager of data communications at Met Life in New York: "We're facing issues of non-SNA transport methods and network management."

Currently, the company has a Systems Network Architecture network consisting of IBM 3090 mainframes and 3270 terminals. The mainframes communicate with terminals and control units at the major offices via T1 lines and an IBM Document Content Architecture multiplexing system.

Judy Filippo

In replacing the terminals with PCs and rerouting communications around the host centers, Bortnyk has come face-to-face with the problem of network management. "On the hierarchical network, we use Netview combined with the Codex 9800 for modem management. But methods on LANs on an office-to-office basis aren't so clearly defined," Bortnyk says.

LAN and wide-area network management bring up other issues, he says, such as facilitating non-SNA activity, effectively using current network managers, such as Netview, and connecting LANs to WANs for effective transport.

Bortnyk is currently evaluating a number of products for managing his network. He is anticipating Open Systems Interconnect network management products and is in the beginning stages of evaluating Accumaster Integrator, an AT&T product that integrates heterogeneous net management tools into a common display station.

Network management is on the minds of many managers with mixed-vendor networking environments.

"In hybrid vendor networks, the biggest headache is network management," says David Passmore, a partner at Network Strategies, Inc., a subsidiary of Ernst & Young, in Fairfax, Va. "Each vendor has its own console, so the poor operator has three or more consoles, each of which looks at a small subset of the network components. Customers are getting tired of that. They want a single net management system with a single console that specifically tells the operator where the fault is."

For example, at Martin Marietta Corp. in Bethesda, Md., network management became an issue when the company began a five-year project to integrate its

INSIDE

By Hook or by Crook
Which of the LAN interconnect technologies is for you? Page 94.

Bucking the Trend
Interview with Peter Sevcik on why not to integrate. Page 99.

Designs for the Future
Tools for network design take on greater challenges. Page 106.

Ryan Garcia is a free-lance writer based in Coram, N.Y.

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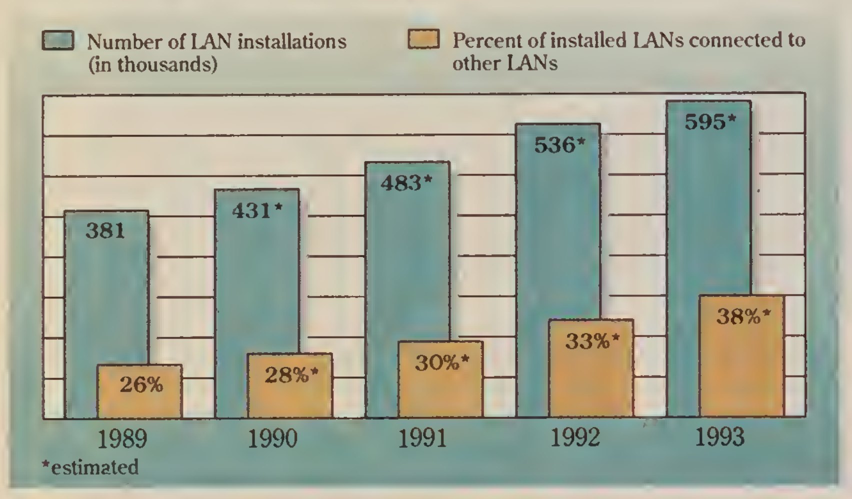
FROM PREVIOUS PAGE

networks into a corporate WAN, according to Chris Gladwin, manager of E-mail standards at the aerospace giant.

Martin Marietta has more than 20,000 microcomputers and is currently networking its IBM Personal Computer and compatible systems with Apple Computer, Inc. Macintoshes. Novell, Inc.'s Netware and Apple's Appleshare are the two dominant networking operations in use.

Talking LAN to LAN

As LANs grow by approximately 50,000 per year, the percentage that will be connected to other LANs should increase



SOURCE: THE EASTERN MANAGEMENT GROUP

CW CHART: MARIE HAINES

With these "metropolitan" networks in place, Martin Marietta is gearing up for wide-area networking. "We will continue to grow metropolitan networks, planning for further connections between networks," Gladwin says.

In order to determine the best possible tools for managing this network, the company formed the LAN Technical Advisory Council, which was made up of 30 key decision-makers. After completing its first evaluation, the group came up with not one but four different network management tools — and no recommendation for a standard product, according to Linda Devers, manager of the aerospace giant's LAN Product Center.

Steve Kropper, a consultant at International Data Corp. in Framingham, Mass., suggests the use of network management services offered by AT&T, MCI Communications Corp. and U.S. Sprint Communications Co. Not only do these services offer performance monitoring, but they also allow users to reconfigure the network according to traffic patterns. In addition, one terminal gives a view of all network components.

Protocols, galore

Aside from network management, the paramount challenge facing network managers and vendors in the '90s is the existence of many protocols, according to many observers.

"With all of the different protocol suites, we're fighting little pockets of fire," says Frank Dzubeck, president of Communication Networks Architects in Washington, D.C.

In the face of SNA, Transmission Control Protocol/Internet Protocol, Decnet, Appletalk and other protocols, corporations are facing the problems resulting from an alphabet-soup mixture of systems, says Daniel Lynch, president of Advanced Computing Environments in Mountain View, Calif.

"What everyone would like to have is just one protocol," Lynch says. "But we don't." As a result, he adds, corporations are trying to merge their different types of technologies.

Consequently, corporate users' favorite tune is fast becoming OSI. In fact, open standards in general are a strong determining force in selecting and implementing networking tools, according to users such as Bryce Morgan, communications manager at Union Carbide Industrial Gases, Inc. in Danbury, Conn.

"We're encouraging vendors to support OSI," Morgan says.

Like most major corporations today, Union Carbide's network, which has an X.25 backbone, is made up of products from different vendors. It features IBM 3090 mainframes, an Application System/400, System/36s and 38s and Hewlett-Packard Co. and Data General Corp. minicomputers. The network also supports nearly 2,000 IBM PC AT and Personal System/2 systems.

In 1986, when Morgan originally began implementing a WAN, he found tools to get it up and running few and far between. "When we were first looking for X.25 networking tools, the biggest difficulty was that a lot of U.S. systems vendors weren't familiar with X.25," Morgan says.

Eventually, the company purchased packet switches and packet assemblers/disassemblers from EDA Instruments in Toronto."We were looking for a vendor devoted to the X.25 technology, and that was hard to find," Morgan says.

Tools for WAN management are the next hurdle Morgan hopes to tackle. "The area we're weakest in is network management tools for LANs and X.25 equipment," he says.

Despite the difficulties involved in enterprisewide networks, there is a very definite emphasis on connecting LANs into a corporate network.

But LANs come with their own set of problems. The wide variety of hardware and software being connected and interconnected has brought about demand for different types of connection and translation tools. "There's strong growth for internetworking products," says Michael Howard, a vice-president at Infonetics, a market research firm in San Jose, Calif.

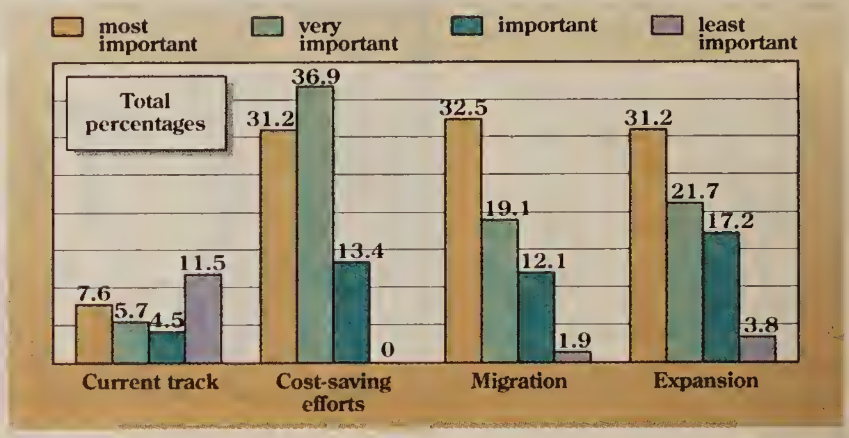
Bridges and routers are fast becoming an integral part of peer-to-peer communications (see story page 94). Bridge shipments are expected to increase from 8,390 in 1988 to 24,587 in 1992, constituting an annual growth rate of about 40%, according to IDC.

Other types of products are coming out to support corporatewide networking as well, including more powerful servers. Novell and 3Com Corp., while still in strong evidence throughout the corporate networking world, are not the only ones competing for the IS network dollar. Start-ups are beginning to unveil products, too. Netframe Systems in Sunnyvale, Calif., for example, recently unveiled a family of "mainframe" servers for large networks, starting at $22,500.

Lynch says that fast, more powerful servers are important network building blocks. "Servers are points of control and cohesion and are important in making a robust network," he says.

Always looking forward

When prioritizing network direction, managers concentrate most on cost savings. However, migrating and expansion follow closely.



SOURCE: NEWTON-EVANS RESEARCH CO., INC.

CW CHART: MARIE HAINES

Another technology that will increase power on LANs and campuswide backbones is Fiber Distributed Data Interface (FDDI). Said to support 100M bit/sec. bandwidth — as compared with Ethernet's 10M bit/sec. maximum — at greater distances than Ethernet, FDDI will become popular as a high-speed backbone connecting large processors, according to Doug Gold, a consultant at IDC.

Another use, according to Passmore, will be as a "facility background network," which is a higher capacity backbone LAN that ties together smaller LANs. That network would then connect to a T1 line via a bridge or router for long-distance connections.

With its bandwidth capability, FDDI also offers greater fault tolerance. "We're going toward FDDI because it's a better way to do redundancy," says Clarence Hoop at the U.S. Department of Defense (see story below). The most important aspect of FDDI will not be speed, he says, but improved network-switching capabilities. "If path A fails, then path B comes into place," he says.

Another advantage of FDDI is that it does not introduce protocol incompatibility. FDDI can support the same upper-level protocols as Ethernet and Token-Ring, such as TCP/IP, Decnet and SNA.

Both Passmore and Gold agree that while fiber may surpass Ethernet on the desktop at some point, the expense prohibits that now. Currently, the $9,000-plus price tag of a direct FDDI interface can only be justified by a powerful (and expensive) workstation that can make use of FDDI speeds in applications such as computer-aided engineering.

Metropolitan Fiber Systems, Inc. in Oakbrook Terrace, Ill., is one vendor that provides communications services over fiber-optic networks. The firm has private networks in Chicago, Philadelphia, San Francisco and Boston and has announced plans for networks in Washington, D.C., New York and Dallas in 1990.

More than 50 businesses have already used the MFS service, including the Chicago Mercantile Exchange. There, brokers can pick up a phone in the exchange pit, tap a button and be in instant contact with a specific phone in New York.

Dexterity testing

Providing interoperability to users of different networking protocols may have tested the dexterity of many managers of large networks. But in the next few years, the integration of voice and data, as defined by Integrated Services Digital Network, will have these managers pulling all-nighters.

One very popular application is now becoming more of a reality, according to IDC's Gold. Phone numbers can be identified automatically and then routed from the private branch exchange to the host computer to send customer files to the user terminal. However, one drawback Gold says he sees is a lack of connections between PBXs and most large systems that exist.

In fact, he says, ISDN is not

No hierarchy here

The U.S. Department of Defense is one site that did not waste time on a hierarchical setup but has always strung together its networks in a peer-to-peer fashion.

According to Clarence Hoop, a program analyst in the programming and financial control division of the Defense Department, the flat architecture serves the Pentagon well: "A big bus structure is like an oil pipeline. If it ruptures, everyone suffers."

Six floors of the Pentagon house a total of 4,400 workstations and personal computers from Xerox Corp., Sun Microsystems, Inc. and IBM. A Synoptics fiber-optic concentrator is used for the interconnection of the main network. A variety of protocols are in place, such as TCP/IP, XNS and Decnet.

The Defense Department sees nothing but benefits from the flat architecture, according to Hoop. "It is a more redundant, more fail-safe package that can also meet some security requirements we have," he says.

Another advantage Hoop cites is easy accessibility to a plethora of information.

"I can go from a Xerox workstation to a terminal emulator to a central communications server to dial out of a modem to the White House system, which I can run from my workstation," he says.

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moving along very quickly.

"ISDN is no closer than it was 10 years ago in terms of commercial services," Gold says. For example, the promise of combining voice and data at the user terminal — in which phone numbers can be dialed directly from the keyboard — has not been fulfilled. Also, speeds over ISDN lines are only in the kilobits per second range, whereas Ethernet is capable of 10M bit/sec.

ISDN has also not arrived at the PBX level. The No. 1 tool today is T1, mainly for cost reasons. "Choosing T1 is a no-brainer because it makes sense economically," Passmore says.

The pendulum has also swung toward the data side of building these T1 networks. The lines used to be bought to carry voice, and unused bandwidth was relegated to data.

"Today, the issue is: Do I have enough data to justify T1 lines? The voice rides for free," Passmore says.

While economical, this method can cause problems. For one thing, all your eggs are now in one basket, according to Passmore. If the T1 line fails, you need intelligent multiplexers and T1 switches to reroute transmissions around downed lines. Another problem is the lack of network management to do capacity planning and active troubleshooting. "There are no network management features to allow managers to manage disparate environments," Gold says.

One company that has found cost savings in combining voice and data over T1 lines is Mattel, Inc. in Hawthorne, Calif.

Ron Wagner, manager of telecommunications networks, says he transmits voice/data at 32K bit/channel using a Racal-Milgo Multiplexer 8000 series. "The quality of voice is superb," he says.

Currently, Mattel's central computing center is in Phoenix, with T1 links to networks in Hawthorne. Between the Phoenix and Hawthorne locations, up to 1,000 users are on the networks per day.

The main reason for integrating voice and data was to save money. "I had a dollar figure I was working with and wanted to get the most I could," Wagner says.

At Brown Brothers Harriman, a New York-based private banking and investment firm, manager Peter Zirelli says

Continued on page 93

What's your problem?

What are the key networking issues that will affect your company in the next 36 months? The following responses given to that question, posed by a Newton-Evans survey this year, include connectivity, network management, cost management and network integration and consolidation.

- Achieving connectivity among all branches through an E-mail setup.
- Consolidated network management. We currently connect everything with Netview interfaces, but that's a "Band-Aid" solution.
- Disaster recovery and capacity management.
- Getting computers to talk to each other. IBM System/36s are especially difficult to integrate.
- How to progress. SNA is outliving its usefulness. We are driven by business needs, but we don't want to be left behind. Also, how do we get our business units to drum up enough new business to justify spending on new technology?
- Integration of two independent voice systems and two independent data systems into one consolidated voice/data network following the merger of two banks.
- Interconnecting the LANs into one big WAN. We may get rid of our 8083 and go with remote computer service. That would be a major logistical headache.
- Knowing exactly what's going on — from response time to traffic levels; levels of traffic are increasing.
- Long-range planning in face of rate changes.
- Migrate from analog to digital transport; migrate from a closed system to an open architecture.
- Multiple protocols are a problem. We have equipment from everybody, and getting it all to talk is quite difficult.
- Network management to overcome barriers of geography and time zones.
- Our No. 1 priority will be the consolidation of the two existing networks into a single voice and data network. We will work on this even if it means paying for the upgrade of telephone systems in entire rural counties, in which our plants are located.
- Qualified staff are extremely hard to find.
- Reliability, cost, performance.
- Transparency of function, a common user interface, bridging different topologies.
- We were purchased three years ago and have just begun the actual consolidation of the systems into one network. We were originally a totally decentralized company.
- We're going more and more to PCs and intelligent workstations and will be using gateways to mainframes a lot.

ATTACHMATE – Extra! SNA 3270 API, HLLAPI, SRPI

BARR SYSTEMS – HASP, SNA Remote Job Entry, SNA 3270

BLACK BOX – BSC, DIAL, SNA 3270, SNA 3770, SNA 5251

cfSOFTWARE – pcMAINFRAME

BLAST – XENIX, UNIX, DOS

CQ COMPUTER COMMUNICATIONS – CQ-3270R-4

CTI-COMMUNICATIONS – 3780FAST

CPAiD – Master Tax/ Electronic Tax Filing

D3 SOFTDESIGN – Sync Tax, BSC 3780, Sync-Claim

EASTHAM & ASSOCIATES – UNISYS Basic Emulation

EMERALD TECHNOLOGIES – 3X Mate 3X Mate UNIX

FORETELL – ESP II, EDI FACT

MICRO INFORMATION SYSTEMS – ECS Electronic Claims System

NETWORK SOFTWARE ASSOCIATES – Remotetalk, ADAPTSNA, 3270 V4, LU6.2 V4, LU0 V4, RJE V4, API, HLLAPI

TECHNOLOGY DEVELOPMENT SYSTEMS – Softmail Electronic Mail

STERLING SOFTWARE – PC-TRACS 3770AF, PC-TRACS 3780

TAXWARE SYSTEMS – Tax Preparation Packages, Electronic Filing

TDT GROUP – SIX/25 3270/3770, X.25, XENIX 286/386, Transfile, PC 3780

TROPICAL COMMUNICATIONS – pcX 25

UNIVERSAL DATA SYSTEMS – BSC, DIAL, SNA 3270, SNA 3770, SNA 4251

CLEO – Datatalker 3270, SNA/SDLC, Datasync 3270, Datasync 3780, UNIX 3780

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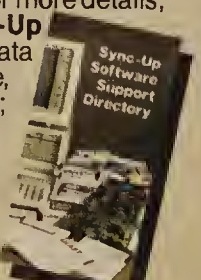

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ASK THE VENDOR

What are the network management capabilities of Republic Telcom Systems' Rnet packet networking system, and will Rnet include internal digital bridging functionalities for open-channel conference calling?
Gerry Colleton
Vice-president, communications
Fulton Prebon (USA), Inc.
New York, N.Y.

REPUBLIC TELCOM SYSTEMS CORP.: Rnet offers a full suite of network management applications through its Network Control System (NCS), which provides centralized management of all network locations.

NCS, which runs on the Intel 80386 personal computer platform under Xenix, displays network status and allows bandwidth allocation management and network configuration control. It also performs diagnostics, alarm monitoring and fault resolution.

The product also collects and maintains call detail records for all completed and failed calls. Rnet's tandem-switch call processing and automatic routing capabilities allow the NCS database to include a range of call data, such as call origin and destination, by trunk group instead of being captured by other network switching systems.

With regard to internal bridging, it is seen as a priority and will be available in future releases.

Using bridge utilization statistics as a guide, at what level should a network manager consider installing parallel bridges — such as Andrew's Bridgeport 7404 or BP 7412 — between two Token-Ring networks?
Jeff Wade
Director of
Information systems
Florida House of Representatives
Tallahassee, Fla.

ANDREW CORP., NETWORK PRODUCTS DIVISION: Andrew BP 7404 local and BP 7412 remote bridges provide 100% source routing, meaning that they conform to the 802.5 IEEE standard. Source routing is how one personal computer on a network establishes a route to another PC on the same network. It provides both fail-safe redundancy and active load sharing through parallel bridges. The very architecture of source routing allows for parallel bridges to share traffic load.

One can also use parallel bridges to achieve a fail-safe link by providing an alternate route for network traffic in the event of a failing bridge. In some situations, one may implement the use of parallel bridges to maximize performance when total network utilization rises above 50% of the theoretical limit.

Continued from page 92

economics were the driving force behind his decision to integrate voice and data. He is using a 56K bit/sec. circuit with four voice digital bands and one data line.

After implementation, Zirelli says, it took a mere six months to see full payback, including the four voice lines, AT&T expenses and other equipment investments. Such voice/data integration is generally quite reliable, according to Zirelli. "We did have one interruption recently," he says. "The voice went out, but the data stayed awake."

Even as technical problems such as the integration of voice and data are being addressed, however, the political issues that so often accompany network computing continue to haunt the offices of network managers. In getting hybrid networks to work together, solving these more emotional issues can be even more difficult than solving the technical ones.

"There are some technical solutions," Lynch says, "but not political ones. This is about ego wars."

John McQuillan, president of McQuillan Consulting in Cambridge, Mass., says a large part of the problem is a lack of understanding among departments about what other parts of the company are doing with their networks. Hence, they clash on what the "best" networking approach might be.

The DOD's Hoop says that the main difficulty in connecting so many different systems is "gaining the confidence of whatever group it is whose LAN you're connecting to."

Although observers agree that solutions to such political infighting are few, some companies attempt to quell the problem with increased communications between employees, particularly those stationed at different geographical network sites.

Network managers would do well to make a list before packing up their tool kits for the integrated, large networks of the '90s. Most companies will not be able to address every problem resulting from such hybrid, complicated environments.

"There are some potholes in the road," Lynch says. "They will be different for every corporation, but managers will do well to educate the user as to where the potholes are." •

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WYSE

Whys and whiches of brouters and bridges

BY MICHAEL HURWICZ

The question of how to get "there" from "here" becomes an important one when you apply it to transporting data from one local-area network to another. It can be the difference between a three-speed bicycle and a 15-speeder that keeps track of miles per hour, rotations per minute and wind currents as you ride.

There are four major categories of LAN interconnection equipment, ranging from the simple and relatively inexpensive to the more sophisticated and costly. Reflecting the complexity of the market, hybrid equipment that crosses established boundaries and borrows the best from two worlds is also appearing.

Repeaters

Repeaters simply pick up a signal on one LAN and repeat it on another. They do not interpret or translate and thus cannot connect different local-area networks such as Ethernet and Token-Ring.

Repeaters can connect different types of media, since that only involves changing the physical form of the signals, not interpreting their meaning. However, they generally cannot connect baseband and broadband LANs because the methods of encoding information are so different in the two systems. Because of their simplicity, repeaters are speedy devices and are also relatively inexpensive. Typical Ethernet or Token-Ring repeaters cost from $1,500 to $3,000.

The disadvantage of repeaters is that they repeat all signals, even if the message is already on its destination segment. Thus, both segments are burdened with useless traffic.

Bridges

Slightly slower but somewhat more selective devices are bridges. Bridges look at the Media Access Control (MAC) destination address on each frame and do not pass it if the frame is already on the right LAN; hence, networks do not get clogged with unnecessary traffic. Priced from $5,000 to $10,000, they work at 1.5K to 12K packet/sec.

The MAC address identifies only the node, not the network the node is on. However, bridges "learn" which nodes respond on each port by requesting acknowledgment that signals were received; in this way, they can send packets addressed to particular nodes to the right port. Bridges cannot forward packets to nodes that are not on directly attached networks.

Furthermore, while a single bridge can pass multiple-packet types, it cannot typically connect different types of LAN hardware. Most bridges on the market today are either Ethernet-to-Ethernet or Token-Ring-to-Token-Ring.

Some vendors have partially overcome the limitations of bridges through "load-balancing" bridges and "spanning-tree" bridges. The load-balancing bridge understands that two of its ports connect to the same network and will try to even out the traffic on the two ports to achieve maximum throughput and minimum delay.

The spanning-tree bridge is aware of links with the potential to reach certain networks, even though they are not currently being used for that purpose. If the active link fails, the spanning-tree bridge routes signals to such standby links.

Routers

Routers can store and interpret information about networks and network routes, even for networks to which they are not directly attached. Thus, they can forward packets in the right direction.

Routers also react to changing conditions. If a link goes down, for instance, a router can find an alternate route.

From a network manager's point of view, these devices are a more natural platform than bridges for gathering network statistics and managing large networks. Bridges can provide statistics only for the network they appear on, while routers cover the whole network as well as network routes. For example, they can report on how long it takes for a packet to arrive at its destination.

Because routers make more complex decisions based on more information, they are usually slower than bridges, running at about 500 to 1,000 packet/sec.

Routing protocols vary for different types of networking software, so these devices have to be designed with specific types of software in mind. It is possible to create routers that handle, say, both Decnet and Transmission Control Protocol/Internet Protocol (TCP/IP). But it is not possible to create routers that will intelligently route just anything that comes down the wire.

At the hardware level, many routers support multiple types of LANs, such as Ethernet, Token-Ring and Arcnet.

Routing is largely a software function, so prices can vary widely. TCP/IP-based routers, for example, may cost more than Ethernet-based bridges because router software is more complex and useful. On the other hand, router software is often bundled with a vendor's LAN operating system. The software runs either on the same personal computer as the file server software or on a separate PC dedicated to routing.

At the hardware level, routers consist of a PC with LAN adapter cards connected to LANs and/or asynchronous cards, X.25 cards or T1 cards connected to remote networks.

Gateways

If two systems do not share a routing protocol, it takes a gateway to get them together. These devices translate all protocols on one network into the protocols on another. For example, if microcomputer users on a Virtual Networking Software, or Vines, network wish to access an IBM mainframe on a Systems Network Architecture network, an SNA gateway would be installed on the microcomputer with special cards that implement low-level SNA protocols. Software runs on top of the gateway that allows workstations on the LAN to go through the gateway and out to the mainframe.

Like routers, gateways are distinguished largely by software, and pricing can vary widely. While some vendors throw in gateway technology as part of the standard operating system, you can also buy gateway software and adapter cards costing thousands of dollars.

Because they deal with such diverse environments and hence have more translating duties than routers, gateways are correspondingly slower.

Brouters and beyond

Hybrid equipment takes the best of two technologies and combines them into one device. One device of this type is the brouter. Brouters have the protocol transparency of bridges and so can pass all kinds of packets without having to understand their routing protocols. It goes beyond bridge functionality in that it can reroute packets when a link fails, as a router does. It cannot offer all the management functionality of a true router, however.

If a routing bridge is a brouter, a "rridge" classification for a bridging router may soon be needed as well. Advanced Computer Communications is preparing to announce such a product, which will route TCP/IP packets and bridge all other packet types. Thus, users can get true routing of TCP/IP packets and still connect Netware or Decnet networks over the same link.

With the boundaries between types of devices blurring and new technologies appearing, choosing among these interconnection tools may become more difficult. However, keeping these basic categories in mind will give you a good start in making your decision. •

Using what, when

- If you want to extend the physical cabling system beyond a certain distance but don't need a remote connection, you may just need a repeater.
- If you have one type of LAN hardware, want filtering and are willing to pay for a fast connection, use a bridge. Unlike repeaters, bridges can also support remote connections over phone lines.
- If you have multiple hardware types, you probably need a router. This will usually give you more complete and useful management capabilities and will be flexible enough to react to changing conditions such as failed links. However, it will typically limit you to one kind of networking software, such as Netware, Decnet or SNA.
- If you need the protocol transparency of a bridge and the flexibility and management of a router, you need a spanning-tree bridge, a brouter or a "rridge."
- If your systems do not have a routing protocol in common, you need a gateway.

Hurwicz is president of the MTI Group, a communications consulting firm in Eastsound, Wash.

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BUYERS' SCORECARD

Netmaster tops Netview with ease

BY MICHAEL SULLIVAN-TRAINOR

Can a small Australian software developer produce a better network product feature-for-feature than the inventors of SNA?

According to more than 160 buyers of IBM Systems Network Architecture network management products surveyed in *Computerworld's* first Buyers' Scorecard, the answer is a resounding yes.

Scorecard	
Netmaster	50
Netview	44

Points are based on ratings of all criteria combined

Respondents rate Netmaster first in all categories except service and support, where IBM's Netview has a very slight edge. Netmaster is the only competitor to Netview in the SNA integrated network management arena. Netmaster was developed by Software Development's International Party Ltd. and marketed by Cincom Systems, Inc., the Cincinnati-based database software maker.

Netmaster scored six points higher than Netview in a weighted total of responses, which takes into account the importance that users attach to the various features being rated (see methodology next page).

Next question: Do these ratings translate into tremendous success for Netmaster? The answer is clearly no. Users who have chosen Netmaster show a loyalty rivaling the allegiance generated by Big Blue itself, but after more than three years of competition, Netmaster has sold only 1,700 licenses, compared with Netview's 13,000.

The reasons vary, but most users say they would rather stay "all-IBM" in their SNA investments or that they had already selected IBM network management products before Netmaster became available.

These factors are strong inhibitors even for those who say they believe Netmaster is the stronger product, as evidenced by comments from Bob Taylor, who is responsible for G. D. Searle & Co.'s Netview installation.

"Netview was the only game in town initially," Taylor says, "and we're sticking with it because it will suffice to meet our needs. But, he adds, "My personal opinion is that in a side-by-side comparison, there's no doubt in my mind we would probably choose Netmaster."

Other factors working against Netmaster are its high initial up-front cost and questions about vendor support.

Although Netmaster winds up slightly cheaper over a three-year period, using the price structure of IBM's Group 40 level processors — which includes 3090s and 3084s — a user installing Netmaster with MVS would pay a $40,000 initial license fee and an $8,000 or 20% annual usage fee.

To purchase Netview outright, a user would pay $80,880. But most users acquire Netview via a $1,685 monthly rental fee, or $20,220 a year.

In the area of vendor support, Cincom has been criticized for failing to strongly market and advance Netmaster by offering new features.

For example, the product lags behind Netview in its support of the latest SNA peer-to-peer communications features, according to David Passmore, a partner at Network Strategies, Inc., a subsidiary of Ernst & Young.

In addition, the question of vendor backing recently became muddied by Software Developments' sale of the Netmaster development rights to Systems Center, Inc., the Reston, Va.-based systems and network software maker.

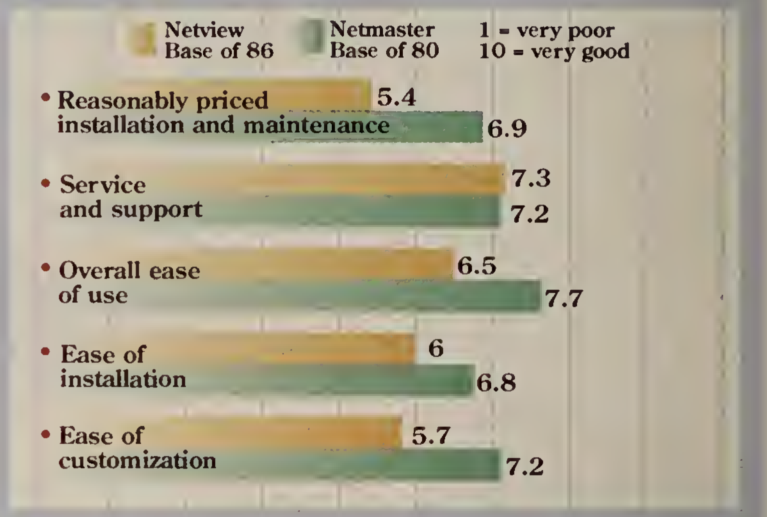
Systems Center is also negotiating with Cincom for the Netmaster marketing rights.

Sullivan-Trainor is a *Computerworld* senior editor, features.

Ratings

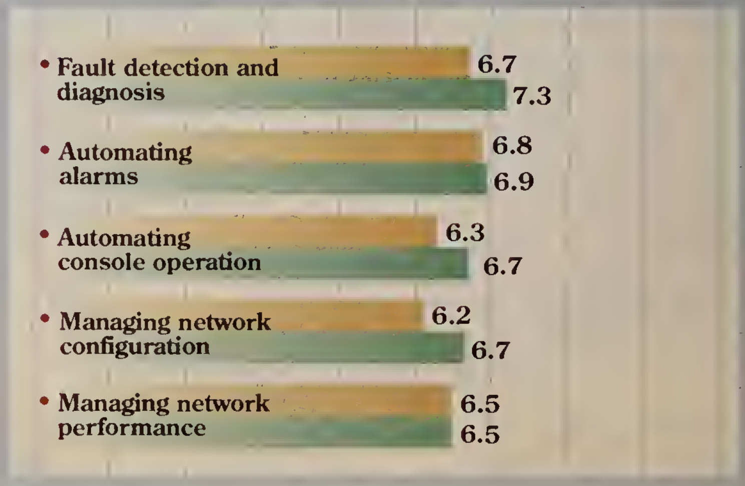
Pricing, support and ease of use

While Netmaster tops all the ease of use and price categories, Netview barely wins out in IBM's legendary area of strength: service and support



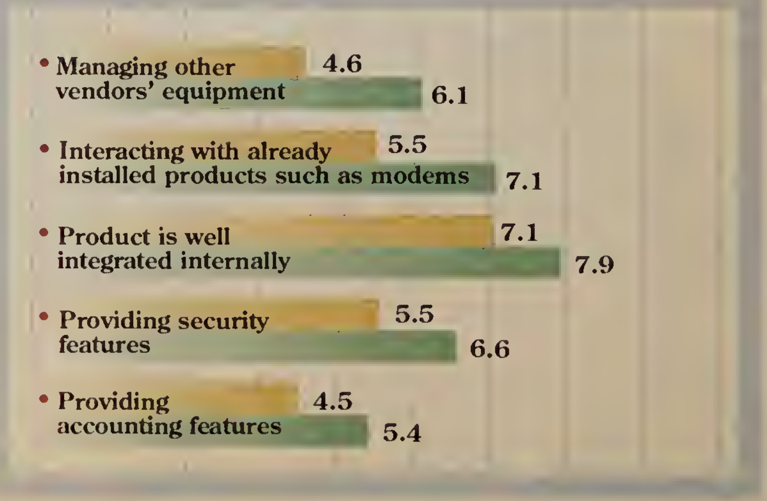
Management functions

Both products management functions score well, with Netmaster holding a slight edge



Key features

Netmaster has higher buyer satisfaction scores than Netview in key areas such as interacting with other vendors' equipment and installed devices

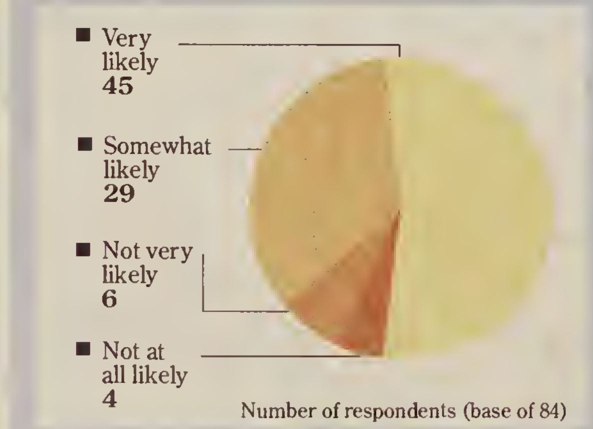


Loyalties

Would you buy the product again?

Netview

Despite lower user ratings, Netview retains the loyalty of most managers who use the product

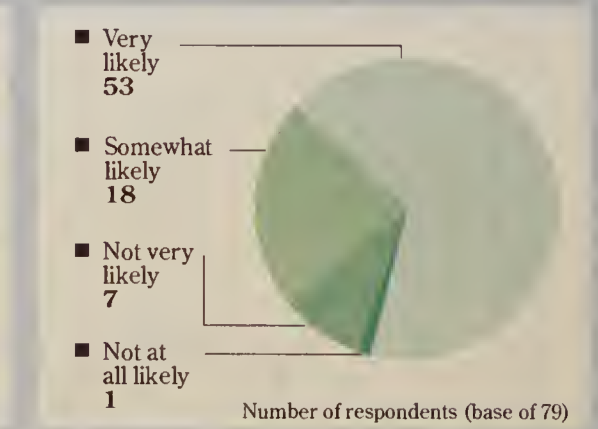


Why ? Number of respondents (base of 46)
Top 7 listed, multiple responses allowed

Because it's an IBM product	18
Good performance	10
It meets our needs	6
Service, support and maintenance	5
Ease of use and installation	2
Well integrated internally	2
Price	1

Netmaster

While Netmaster buyers rate their product more highly, they show nearly the same level of loyalty as Netview users



Why ? Number of respondents (base of 56)
Top 7 listed, multiple responses allowed

Ease of use and installation	18
Good performance	14
It meets our needs	13
Better value for the money	8
Well integrated with other products	3
Well integrated internally	3
Ability to customize	3

IBM leads the pack in five-vendor comparison

Succeeding at multivendor network management is like grabbing a handful of snakes and tying them together. However you do it, it's very easy to get bitten.

To minimize the damage, users are going with what is familiar. According to the Buyers' Scorecard buying intentions survey, 66% of 342 respondents would select the same vendor for multivendor products as the one providing their current network management systems.

The respondents — data communications and information systems managers — were randomly chosen from lists of users of AT&T, IBM, Digital Equipment Corp., Hewlett-Packard Co. and Cincom Systems, Inc. network management products. They were asked to select the primary strategic vendor that they would choose for multivendor management when fully functional products become available.

Users' tendencies to choose what they know favors IBM, which has the largest installed base of network management products. While DEC and HP fared well with their installed bases, AT&T and Cincom will likely wind up sharing their slices with IBM as Systems Network Architecture (SNA) users influence the multivendor selections of their companies.

This bias is ironic, according to Atul Kapoor, a principal at Kaptronix, Inc. in Haworth, N.J., because AT&T is offering the more complete product set.

"AT&T's strength is multivendor networking," Kapoor says. "The Accumaster product requires other vendor's network management systems to be in place and then integrates them. It is the only pure integrator."

Another factor preventing strong acceptance of Accumaster may be the cost. The product set is priced from $300,000 to $400,000.

However, AT&T has support from Cincom for SNA management through Netmaster, as well as broad T1 and modem network support from a number of vendors.

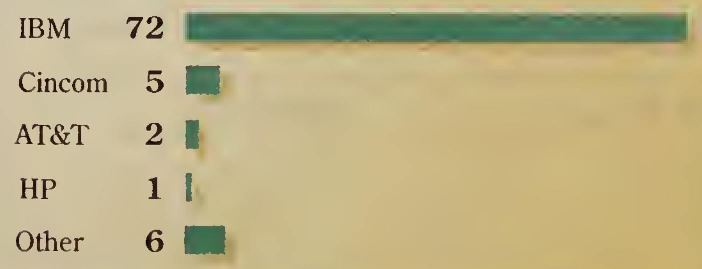
IBM's approach, on the other hand, is to offer connection with other vendors' equipment through Netview using Netview PC as an intermediary. Likewise, Cincom's Netmaster can replace Netview and link other vendors' products through Netview PC.

MICHAEL SULLIVAN-TRAINOR

Multivendor Buying Intentions

IBM users remain loyal

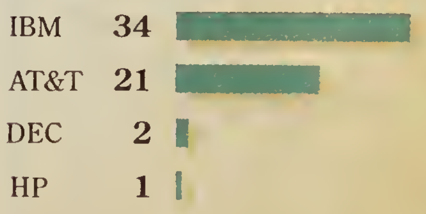
Users of IBM's Netview plan to stick with it as their multivendor management choice despite concerns about the weaknesses of some functions and criticism of Netview/PC



Number of respondents (base of 86)

AT&T users moving towards IBM

Users of AT&T network management products favor IBM's Netview over AT&T's Accumaster Integrator as their multivendor management solution



Why ?

1 IBM-based company
2 Product already installed
3 Strategic support
4 DEC-based company
5 Compatibility

Number of respondents (base of 52) multiple responses allowed

Hot issues

Users rate service and support the most important multivendor network management issue. The ratings are based on a scale of 1-to-10, with 10 being very important and 1 being least important

1 Service and support (8.6)

2 Product is well integrated internally (8.4)

3 Fault detection and diagnosis (8.3)

4 Overall ease of use (8.1)

5 Interaction with installed products (8)

6 Reasonably priced installation and maintenance (7.8)

7 Managing network performance (7.7)

8 Managing network configuration (7.7)

9 Ease of customization (7.6)

10 Automating alarms (7.3)

11 Providing security features (7)

12 Ease of installation (7)

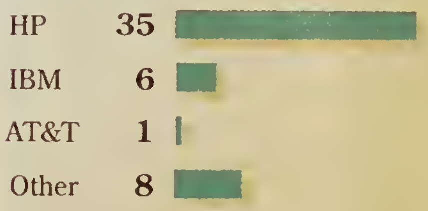
13 Managing other vendors' equipment (6.9)

14 Automating console operations (6.8)

15 Automatic alarm prioritization (6.5)

Most HP users plan on Openview

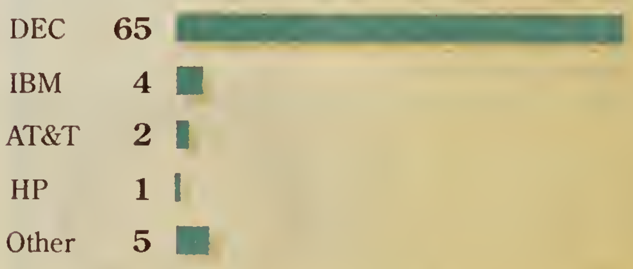
Most Hewlett-Packard users see HP's Openview as their strategic multivendor management choice, with a few planning on IBM's Netview



Number of respondents (base of 50)

DEC users willing to wait

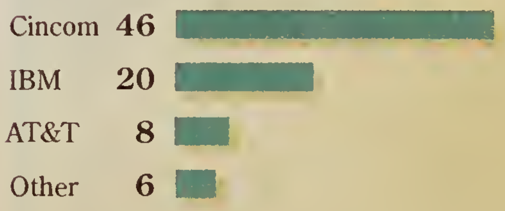
Users of DEC network management products overwhelmingly chose DEC's Enterprise Management Architecture as their strategic solution



Number of respondents (base of 75) multiple responses allowed

Netmaster holds its own

Cincom's Netmaster remains the choice of many SNA network managers, although some are switching to Netview



Number of respondents (base of 80)

CW CHARTS: JOHN YORK

METHODOLOGY

Computerworld's Buyers' Scorecard ratings were based on telephone surveys conducted by First Market Research in Austin, Texas, and mail surveys conducted by IDG Research Services in Natick, Mass. Survey development and tabulations were performed by IDG Research Services.

Lists of users of each product under study were provided by objective, nonvendor sources. The survey participants were randomly chosen from these lists.

The Netview-Netmaster comparisons were based on phone interviews with more than 80 users of each product. User bases for the Multivendor Network Management survey were a minimum of 50 respondents per vendor.

Participants were prequalified as users of the network management tools of the identified vendors.

Computation of the weighted scores:

The weighted scores were computed by multiplying two factors for each product: (1) The mean importance rating (assigned by all users to each criterion); and (2) The mean rating each product achieved on each of those measures.

For example, the mean importance rating for overall ease-of-use on a scale of 1-to-10 was 7.87. This was multiplied by the mean rating Netview achieved on that measure — 6.5 — for a weighted score of 51.2.

The same ease-of-use rating — 7.87 — was also multiplied by Netmaster's mean rating on that measure — 7.73 — for a weighted score of 60.8.

The two overall weighted scores — 44 for Netview and 50 for Netmaster — represent the mean totals for the weighted scores of all the criteria.

ACKNOWLEDGMENT

Computerworld would like to acknowledge the assistance provided in the assembly of this Buyers' Scorecard by the following people and organizations: James Herman, a principal at Northeast Consulting Resources in Boston, Mass.; Atul Kapoor, a principal of Kaptronix, Inc. in Haworth, N.J.; David Passmore, a partner at Network Strategies, Inc., a subsidiary of Ernst & Young in Fairfax, Va.; Computer Intelligence Corp. in La Jolla, Calif., Dataquest/Focus Research Division in Farmington, Conn.; Installed Technology International and International Data Corp., both in Framingham, Mass.

View from the front

Pioneers praise flexibility of new products

DEC User

Bill Fithen:
Manager of network planning, University of Pittsburgh.

Strategic Choice: DEC

Reason: DEC's network management approach is very open. We already have the documentation for modules for the new products. Enterprise Management Architecture (EMA) will provide workstation and operating system management as well as network management.

Environment: The university uses a 4,000-device Ethernet network, including Sun, DEC, Apollo, Apple and DOS systems. Currently, we are using the DEC Management Control Center Site Management System.

Product strengths: In the past, DEC has supplied point products — tools for individual products such as terminal servers. The Site Management System (SMS) is a packaged version of these products. It includes point products under one product code and installation. The people who purchase it will slowly move to the ultimate EMA.

Product weaknesses: We installed SMS because the package came with new versions for all our old point products, not because of the windowing. It operates under Decwindows concurrently, but there is not a great deal of additional functionality.

Expectations: When EMA hits the streets, I expect it will include a graphics display of the network topology, a windowing point-and-click environment rather than command lines to navigate through the management functions and alarms with color-coded event notification for specific devices.

AT&T User

Gary Orrell:
Staff vice-president of IS, The Hertz Corp., Oklahoma City.

Strategic Choice: AT&T

Reason: We wanted a unified approach to our network requirements, and AT&T seemed to provide this in the most effective way. The Accumaster products will provide the overall governing network monitoring for us. We will continue to use Netview for troubleshooting specifically related to our IBM environment.

Environment: AT&T products will be used to manage Hertz's telecommunications network, including the ASAP reservations system in 1,800 locations in the U.S. The company is currently using Starkeeper and associated systems, and we will add the Accumaster Integrator in the future. The Accumaster will work with Netview and Netview PC, which the company plans to acquire soon.

Product strengths: AT&T allows us to integrate multiple protocols into one network. If another vendor comes out with a new offering, our management systems will accommodate it. It is not restricted to certain vendors' products as other vendor's offerings are.

Product weaknesses: We began installation last August, and there were some start-up bugs as you might expect with a product that was not yet generally available. The support from AT&T was very good. There is more customizing we want to do.

Expectations: We don't see the AT&T products as a replacement for Netview. It provides a very efficient way to integrate Netview into our overall network management requirements.

IBM User

Sam Coffee:
Manager of Network Management Systems, Union Pacific Railroad, Omaha.

Strategic Choice: IBM

Reason: We've had Netview since it came out. We're reluctant to move away from the mainstream product line. We've enhanced it by using US West's Netcenter graphical interface and Netview PC.

Environment: Union Pacific uses a 12,000-node Systems Network Architecture network, 400 microwave sites, fiber and T1 lines, multiplexers, modems, a Tandem computer-controlled radio network, railroad communications devices and a DEC Ethernet network. The organization is currently using Netview, Netcenter (acquired in June) and Netview PC.

Product strengths: Netview PC itself is pretty good because it provides a lot of functions. But new users find it difficult to write applications for it. Netcenter is allowing us to obtain a graphical representation of the network.

Product weaknesses: We're working with a consultant to develop an application generator to make Netview PC easier to use. We went to Netcenter because Netview requires people to understand all the command syntax for VTAM.

Expectations: I want the workstation in the network control center to be the place where you can perform every function that's required. It should also be easy to use through a pull-down menu and point-and-click environment. I can do that now, but I have to jump into a 3270 session to open my problem log or look at my configuration. I want that window to be relatively transparent.

HP User

Lewis Darymple:
Computer Data Center Supervisor, City of Tempe, Tempe, Ariz.

Strategic Choice: Hewlett-Packard Co.

Reason: Openview is a great idea, an extension of Windows with clever tools added. It will be a vehicle for whatever we want to attach to it. We can develop a software subsystem to window whatever network management tools we want.

Environment: The city is one of the largest HP users in the Southwestern U.S. The network includes 15 HP 3000s, 200 PCs, 22 subnets and 25 network bridges.

We are currently using Openview with the Bridge Manager.

Product strengths: If you have Windows background, Openview is very easy to use. We used to have difficulty viewing network problems. Our procedures were very cumbersome.

Now, we can window right into the subnet and control the bridges.

Product weaknesses: We're not a huge network, and we're weighing the cost of the products against our needs. I'd like them to do more with the icons to provide a global picture of the network on a single screen. Now, you can get a picture, but you have to use more than one screen.

Expectations: We're waiting to get an idea of what else is available. The bridge is a first-level tool for watching the traffic. We will probably use various tools in the coming years, depending on their cost and value to us. I'm still waiting to see what will be offered, but Openview looks like a good vehicle for the future.

Cincom User

Chris Hawkins:
IS Manager
Dayton Power & Light Co.
Dayton, Ohio

Strategic Choice: Cincom

Reason: Netmaster provides the complete network management integration that we need in the most cost-effective manner. The product is strategically well-positioned in our IS architecture, and it provides a cohesive approach.

Environment: The company uses an IBM 3090 to run an SNA network with more than 550 display stations and 50 remote printers in more than 20 locations. We are currently using Netmaster for SNA management and IBM's Netview PC to monitor a Rolm telephone network.

Product strengths: The most useful feature is Netmaster's Network Control Language. It allows us to develop our automated procedures. Overall, the product's components are flexible and easy to use.

Product weaknesses: We have some questions: Will Netmaster interface well with the new technologies that we are looking at, such as fiber-optic cable, higher speed communications links and ISDN? Will the change in ownership by Systems Center (if that deal is executed) help the product keep up with Netview and SNA functionally? Time will tell.

Expectations: We're looking at interfacing some additional alerts into Netmaster through a generic format to provide monitoring and testing of our telecommunications circuits and microwave radio network. We will continue to use Netview PC for the Rolm alert monitor, but we may migrate away from Rolm technology.

INTERVIEW

Why integrate?

The single, enterprisewide network makes no sense for a business with diverse networking needs, says consultant Peter Sevcik. Interoperability among many different networks better serves the needs of today's companies.

Stop tying yourself in knots trying to achieve total network integration, says Peter Sevcik. Living with diversity is not only easier; it also makes better business sense.

Sevcik is an independent network consultant in Cambridge, Mass. He believes that rather than constructing one large and uniform network, network managers should focus on interoperability among various networks, each of which represents the best choice for specific functions or departments.

Specializing in large and international networks, Sevcik has been involved with network planning design and installation since 1969. He spoke recently with Boston-based free-lance writer Alan Radding.

What's wrong with striving for wide-scale integration of networks within an enterprise?
In the 1980s, the emphasis was on integration; that is, finding a single network that serves as the highway that everyone connects to. That network, it was believed, would save money through economies of scale and would interconnect us so we can talk to each other. Well, it was not all that easy to accomplish either of these goals. Who would manage the network? Where was the central organization that was going to own the line?

Another issue is that the central organization isn't that responsive anymore. Even after a corporate network gets built, people still build more networks around it.

If we don't integrate all these different networks, what do we do with them?
The question is, how do I get the benefits of interconnecting people without enterprisewide integration? We are actually approaching full interconnection through gateway products.

A lot of organizations are finding TCP/IP a very attractive way of connecting their enterprises, either by putting everybody on a TCP/IP network or interconnecting multiple TCP/IP networks. Let the users build their separate networks. Then, put in a few routers and bridges for that small amount of traffic that needs to go from one part of the enterprise to another.

You get the benefit of having one part of the enterprise talk to another, plus you get a wide variety of products available to you. Within the TCP/IP world there is a multiplicity of vendors.

But what about the benefits of standardization, like economy of scale and staffing efficiency?
In the first place, I have a different sense of "economy of scale." Say I do all my networking with SNA: I can do competitive [transmission] procurement by bundling all the transmissions for all the SNA networks and buying it in a competitive, smart fashion.

The converse is I can buy hardware in a bulk, competitive fashion. For instance, if I standardize on Unix as a platform with TCP/IP, I can now be a smart shopper: I have multiple vendors of the technology.

Martha Everson

Years ago, this wouldn't have sounded too smart because the transmission piece was always expensive. Now it turns out to be smarter, at least within the U.S., to be competitive in buying the technology.

What about staffing? Aren't people ultimately more expensive than hardware?
That's a good point — people *are* more expensive. Each of these networks has to be managed individually. A lot of the industry is just waking up to the fact that this requires manpower they haven't budgeted for.

You often talk about interoperability rather than integration. What's the difference?
Integration doesn't necessarily embrace interoperability. Taking Decnet and SNA networks and integrating their transmission on one T1 line saves money and provides a single point of management for transmission. So from a cost and management point of view, it is a good thing, but there is absolutely no interoperability.

On the other hand, you could take two different local-area networks and manage them completely separately but have them both use TCP/IP and put a line between them. This allows interoperability, but it doesn't integrate the management and doesn't look at any cost sharing.

Is there a single problem or drawback to integration that, if solved, can give us both integration and interoperability?
Planning and management of information technology starts at the desktop, and a single network doesn't allow for local economy, local control and local variety.

Doesn't what you are saying really amount to a recommendation of TCP/IP as the standard?
The world is learning to live with multiple standards, gateway them, interconnect them and provide some kind of interoperability. That is the architecture of the future.

If someday we all go to OSI, I'm claiming there will still be a multiplicity of standards that will need to be gatewayed and internetted.

What are the great challenges facing network managers today?
Networks are happening beyond the IS manager's control. The challenge is to effectively manage their interconnection.

While managers were managing integration, worrying about saving money and managing old technology, other parts of the enterprise bought all this hot new technology. New styles of management are required to take care of all this technology. For instance, users and network managers could form a committee to develop corporate standards and policies.

I think the pendulum will swing back, with some of the people on the outside saying, "Gee, I had fun buying all this, but isn't there somebody in the enterprise here that will just run it for me?" Then the central network manager will have an active job again.

What is your vision of the corporate network of the 1990s?
It will be a network of LANs with the data rates decreasing as we go to the core, the opposite of what it used to be. We will also see very high-speed LANs — 100M bit/sec. — connecting workstations and powerful servers at the most local level.

Those will be internetted to lower speed campus networks within a metropolitan area. Further, those will be internetted to lower speed yet long-haul networking technology. The highest volume and most responsive data interaction will be occurring close to the user and his workstation, and there will be less and less time-critical action on the long-haul network.

The long-haul network will be there for the infrequent yet important cross-pollination of the parts of the enterprise that need such cross-pollination.

When you tell your clients that the pursuit of enterprisewide integration is futile, what are their reactions?
I don't have to tell them — most of them already know it. Most are faced with the problem that there is more networking going on in the enterprise than they have control over. •

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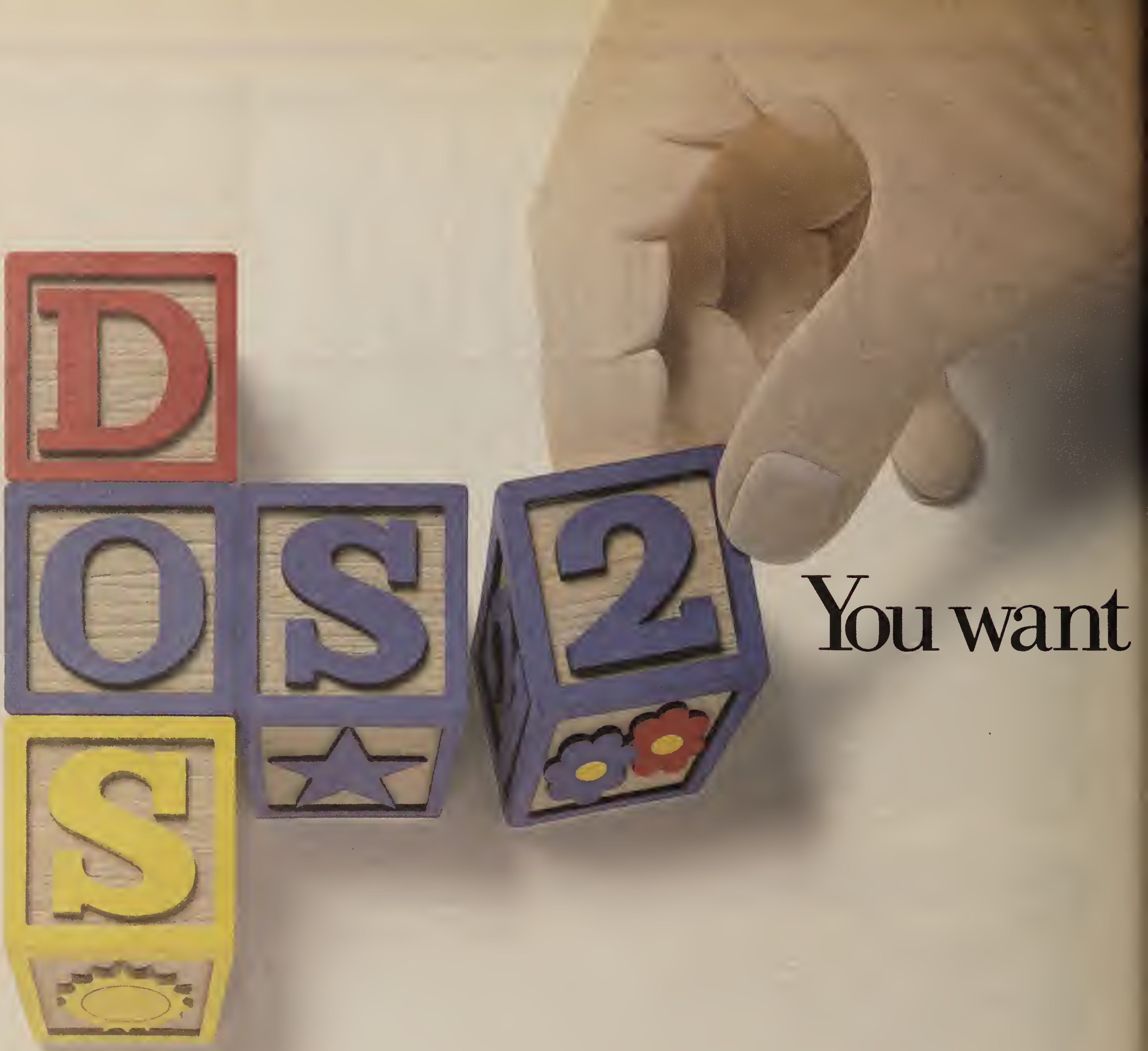
COMPANY	PRODUCT	SINGLE OR MULTIPLE PROCESSOR(S)	INTERNAL CPU	BUS SPEED (BIT/SEC.)	MAX. TRANSMISSION SPEED (BIT/SEC.)	MAX. NO. TRUNKS IN SIMULTANEOUS OPERATION	MAX. THROUGHPUT (PACKET/SEC.)	MAX. NO. CALL SETUP/SEC.	MAX. NO. VIRTUAL CIRCUITS PER NODE	TYPES OF REDUNDANCY SUPPORTED	FRAME RELAY	INTERNAL PAD	PROTOCOLS SUPPORTED	NETWORK MANAGEMENT SYSTEM SUPPORTED	NETWORK MANAGEMENT FEATURES AND FUNCTIONS	THROUGHPUT DELAY FOR X.25 PROTOCOL (MSEC.)	BASE PRICE
Algo, Inc. **(301) 672-1544**	Algo MC 606 Message Concentrator	Single	Z80	4M	9.6K	100+	20	5	5	None	Yes	No	Asynch	Proprietary	Application-dependent	NA	$895
Amnet, Inc. **(508) 879-6306**	Nucleus 7000	Multiple	80286, 80386	64M	64K	32	1,000	10	264	CPU	No	Yes	X.25, IBM 3270 and 2780/3780, SNA/ SDLC, BSC, asynch	Proprietary (SCO Xenix application)	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	16	$7,490
Applied Innovation, Inc. **(800) 247-9482**	AISwitch Series 90 and 180	Multiple	68010	9.8M	64K	8	320	25	128	CPU	No	No	X.25	None	Performance monitor, fault isolation	350	$9,000
AT&T Network Systems **(800) 638-7978**	5ESS Switch	Multiple	68030	10M	64K	80	12.8K	480	10,240	Bus	No	No	X.25, X.75	Netpartner	CCITT MML, graphics, configuration management, performance monitor, accounting/ billing statistics, fault isolation, distributed management	9	NP
BBN Communications Corp. **(617) 873-3268**	C/3, C/30 and C/300 packet-switching nodes	Single	Proprietary	NP	64K	14	NP	40	1,200	CPU, bus, line sets	No	No	X.25, X.75, IBM 3270 and 2780/3780, SNA/SDLC, BSC	Unix-based proprietary	Graphics, configuration management, accounting/billing statistics, fault isolation, distributed management	NP	$19,000-$175,000
BT Datacom **(703) 818-1770**	DM 3100	Single	80186	8M	64K	1	35	7	500	None	No	Yes	X.25, IBM 3270, SNA/ SDLC, asynch	Any that runs on DM 3200, PC AT	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation	20	$6,000
	DM 3300	Single	80286	10M	64K	4	80	15	500	None	No	Yes	See above	See above	See above	10	$10,000
	DM 3140	Single	80186	10M	64K	10	50	9	500	None	No	Yes	See above	See above	See above	20	$6,000
	DM 3600	Single	68010	10M	64K	4	150	15	1,250	None	No	Yes	X.25, IBM 3270, SNA/SDLC, BSC, asynch	See above	Configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	7	$16,000
	DM 3760	Multiple	68010	10M	64K	12	200	20	12,500	CPU	No	Yes	See above	Interactive Network Facilities (INF)	See above	10	$32,000
	DM 3940	Multiple	68020	10M	64K	24	1,200	60	4,000	CPU	No	Yes	See above	See above	See above	2.5	$56,000
	DM 3950	Multiple	68020	10M	64K	24	2,000	60	4,000	CPU	No	Yes	See above	See above	Configuration management, accounting/billing statistics, fault isolation, distributed management	2.5	$96,000
BT Tymnet, Inc. **(408) 922-0250**	Turbo Engine family	Multiple	68000 series	40M	384K	NP	8,000	NA	24,000	CPU, line sets	Yes	Yes	X.25, X.75, IBM 3270 and 2780/3780, SNA/SDLC, BSC, asynch, HASP, Burroughs Poll Select	Proprietary	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	13	$30,000-$81,000
CASE/Datatel **(800) 424-4451**	PSX8400	Multiple	68020	64M	64K	32	1,600	10	2,048	Bus	No	No	X.25	Any that runs on IBM PC AT386, Sun Sparcstation	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	17	$17,000
	PSX8500	Multiple	68020	64M	64K	64	3,200	10	4,096	Bus	No	No	X.25	Any that runs on IBM PC AT386, Sun Sparcstation	See above	17	$28,500
Codex Corp. **(617) 364-2000**	6525 Packet Switch	Single	68000	10M	80K	48	300	55	3,500	CPU, bus, line sets	No	Yes	X.25, SNA/SDLC, BSC, X.28, X.29, X.32, X.121	Codex 9800, 9300	CCITT MML, graphics, configuration management, performance monitor, accounting/billing statitics, fault isolation, distributed management	20	$4,500
	6690 X.25 Switch	Multiple	80186, 80286	10M	64K	72	3,000	10	16,000	CPU, bus, line sets	No	Yes	X.25, X.75, SNA/SDLC	Codex 9800, 6600 NCP	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	16	$64,000
Develcon Electronics Ltd. **(416) 495-8666**	Develnet	Multiple	Z80, Z8000, 68000	96M	128K	60	250	5	3,000	CPU	Yes	Yes	X.25, IBM 3270, SNA/SDLC, BSC, asynch, TCP/IP, HP ENQ/AC	Proprietary	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	0.5	$10,000
Dynatech Communications **(703) 550-0011**	CPX 20	Multiple	68000	128M	64K	20	1,000+	20	2,048	Line sets	No	Yes	X.25, asynch	Proprietary	Configuration management, performance monitor, accounting/ billing statistics, distributed management	2.13	$7,950
EDA Instruments, Inc. **(416) 425-7800**	MPX.25000 System	Multiple	Rockwell 6512	NA	100K	32	2,400	960	8,192	CPU, bus, line sets	Yes	Yes	X.25, IBM 3270 and 2780/3780, SNA/ SDLC, BSC asynch, Unisys	Netview, proprietary	Configuration management, performance monitor, accounting/ billing statistics, fault isolation, distributed management	0.5	$2,000
Franklin Datacom, Inc. **(800) 347-3850**	Multiprotocol X.25 Switch/PAD	Multiple	80186, 80286	10M	64K	64	600	50	2,048	CPU	No	Yes	X.25, IBM 3270, 2780/3780, SNA/SDLC, BSC, asynch, NCR, HIS, Unisys	Any that runs on PC AT	Configuration management, performance monitor, accounting/billing statistics, fault isolation	20	$4,000-$20,000

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld.* When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

COMPANY	PRODUCT	SINGLE OR MULTIPLE PROCESSOR(S)	INTERNAL CPU	BUS SPEED (BIT/SEC.)	MAX. TRANSMISSION SPEED (BIT/SEC.)	MAX. NO. TRUNKS IN SIMULTANEOUS OPERATION	MAX. THROUGHPUT (PACKET/SEC.)	MAX. NO. CALL SETUP/SEC.	MAX. NO. VIRTUAL CIRCUITS PER NODE	TYPES OF REDUNDANCY SUPPORTED	FRAME RELAY	INTERNAL PAD	PROTOCOLS SUPPORTED	NETWORK MANAGEMENT SYSTEM SUPPORTED	NETWORK MANAGEMENT FEATURES AND FUNCTIONS	THROUGHPUT DELAY FOR X.25 PROTOCOL (MSEC.)	BASE PRICE
General Datacomm Industries, Inc. **(203) 574-1118**	Genpac series	Both	68000	17M	64K	24	600	10	252	CPU, line sets	No	Yes	X.25, BSC, asynch	GEN Net Manager II	Configuration management, performance monitor, fault isolation, distributed management	50	$1,695-$15,160
Hewlett-Packard Co. **(800) 752-0900**	HP Private Packet Network Model 80	Multiple	80286	10M	64K	120	2,000	10	8,000	CPU, bus, line sets	No	No	X.25, X.75	HP 9000	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	20	$30,000
Hughes Network Systems **(301) 428-2752**	Integrated Packet Network, 9000 NPX	Multiple	80186, 80286	10M	128K	72	3,200	140	16,000	CPU, bus, line sets	No	Yes	X.25, X.75, SNA/SDLC	Netview	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed managment	22	$30,000
Infotron Systems Corp. **(609) 424-9400**	Streamline 25	Multiple	68030	4M	1.5M	32	2,000	680	12,000	CPU, bus, line sets	No	No	X.25, X.75	Apollo DN3500	CCITT MML, graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	8-10	$20,700-$350,000
Memotec **(514) 738-4781**	SP/MP9000	Multiple	Z280	8M	64K	54	1,800	900	2,300	CPU	No	Yes	X.25, IBM 3270, 2780/3780, SNA/SDLC, BSC, asynch	Any that runs on PC AT, VAX	Configuration management, accounting/billing statistics, fault isolation, distributed management	0.5	$11,000
Metacomp, Inc. **(619) 673-0800**	ATcomm - X.25 Server	Single	80186	2.2M	2.2M	1	300	256	1,000	Line sets	No	Yes	X.25, X.75, asynch	Proprietary	Configuration management, performance monitor, accounting/billing statistics	NP	$2,285
Micom Communications Corp. **(805) 583-8600**	MBE Micom Business Exchange	Multiple	68000 series	8M	153.6K	34	520	30	4,096	Line sets	Yes	Yes	X.25, X.75, IBM 3270, SNA/SDLC, HDLC, TCP/IP, 802.3 Ethernet	Micom XNMS	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	5	$8,750
	MB300-PSW	Single	Z280	10M	72K	18	320	20	256	None	No	Yes	X.25, IBM 3270, SNA/SDLC, BSC, asynch	Micom XNMS	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	2.5	$4,450
NEC America, Inc. **(516) 753-7000**	NP140, MP150	Multiple	80286, 80386	32M	1.5M	72	12,000	1,200	102,400	CPU, bus, line sets	No	No	X.25, X.75, IBM 3270 and 2780/3780, SNA/SDLC, BSC, asynch	Unix-based SQL Informix database	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	20	$37,500
N.E.T., Inc., Access Products Division **(805) 685-1411**	Packet Plus/50	Multiple	80186, 8086	8M	256K	16	2,500	320	2,000	None	No	No	X.25, asynch	Proprietary	Configuration management, performance monitor, fault isolation, distributed management	1.5-5	$10,785
Netrix Corp. **(703) 742-6000**	#1-ISS	Multiple	68000 series	64M	1.5M	32	2,100	600	4,000	CPU, bus, line sets	No	No	X.25, X.75, IBM 3270, 2780/3780 and 5250, SNA/SDLC, BSC, asynch, NCR, Burroughs Poll Select, Honeywell VIP	HP/Apollo DN3500	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	12-30	$18,250
Northern Telecom, Inc. **(919) 992-2000** **(613) 727-0300 (in Canada)**	DPN 100 series	Multiple	80286	44M	192K (line), 2M (trunk)	20	30,000	2,500	300,000	CPU, bus, line sets	No	Yes	X.25, X.75, IBM 3270, SNA/SDLC, BSC, asynch, SNA multihost, API, X.32	Any that runs on VAX, IBM, Sun Microsystems, Unix System V	CCITT MML, graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	12.5	$5,000
OST, Inc. **(703) 817-0400**	ECOM 25 Model M	Multiple	68020, 68000	20M	72K	36	1,000	40	2,034	Line sets	No	Yes	X.25, X.75, SNA/SDLC, asynch, VIP 7700	Proprietary	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	5.75	$15,000
PCI Telematics Co. **(818) 880-4900**	Smarnet 3000	Single	80286	80M	76.8K	4	225	20	1,024	Line sets	No	Yes	X.25, IBM 3270, SNA/ SDLC, asynch	Smartview/ INF	Configuration management, performance monitor, accounting/billing statistics, fault isolation	10	$4,500
Plantronics Futurcomms, Inc. **(800) 537-9804**	Microturbo and PAC.25 Turbo	Both	68000	12 MHz	19.2K for Microturbo, 64M for Pac.25 Turbo	10/12	60/300	20	40/250	None	Yes	Yes	X.25, IBM 3270 and 2780/3780, SNA/ SDLC, BSC, asynch, Telex	Proprietary	Configuration management, performance monitor, accounting/ billing statistics, fault isolation, distributed management	3.5-10	$2,995-$15,000
SR Systems **(514) 335-6442**	SRS 5500	Multiple	Z80 series	1.6M	19.2K	16	60	100	4,096	CPU, bus	Yes	Yes	X.25, X.75, asynch	Proprietary	Configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	25	$25,000
Telecommunications Data Services, Inc. **(714) 474-7744**	Tesys	Multiple	80286, 80386	40M	64K	68	4,930	850	42,840	CPU, bus, line sets	None	Yes	X.25, X.75, IBM 3270 and 2780/3780, SNA/SDLC, asynch, Visa, Telex	Unix-based	CCITT MML, graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	65	$600 per port
Telefile, Inc. **(714) 250-1830**	Tele-Switch	Single	68000	40M	153.6K	10	600	30	4,096	Line sets	Yes	Yes	X.25, asynch	Any that runs on PC AT, Sun 3/80	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation	1.7	$4,000
	Mega-Switcb	Multiple	68020	2.4M	2.4M	30	2,500	50	4,096	Line sets	Yes	Yes	X.25, asynch	Any that runs on PC AT, Sun 3/80	See above	0.85	$40,000
Tellabs, Inc. **(708) 969-8800**	331 Xplexer	Multiple	Z8000	NP	76.8K	18	19.2K	30	4,500	No	Yes	Yes	X.25, SNA/ SDLC, BSC, asynch	320 Network Monitor	Performance monitor, distributed management	100	$2,550
TIL Systems, Inc. **(508) 970-1189**	Xpert PDX	Multiple	National Semiconductor 32000 series	NP	9.6K	16	25	NP	255	Line sets	No	No	X.25, IBM 3270, SNA/ SDLC, BSC, asynch	Xpert Supervisor	Configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	NP	$6,350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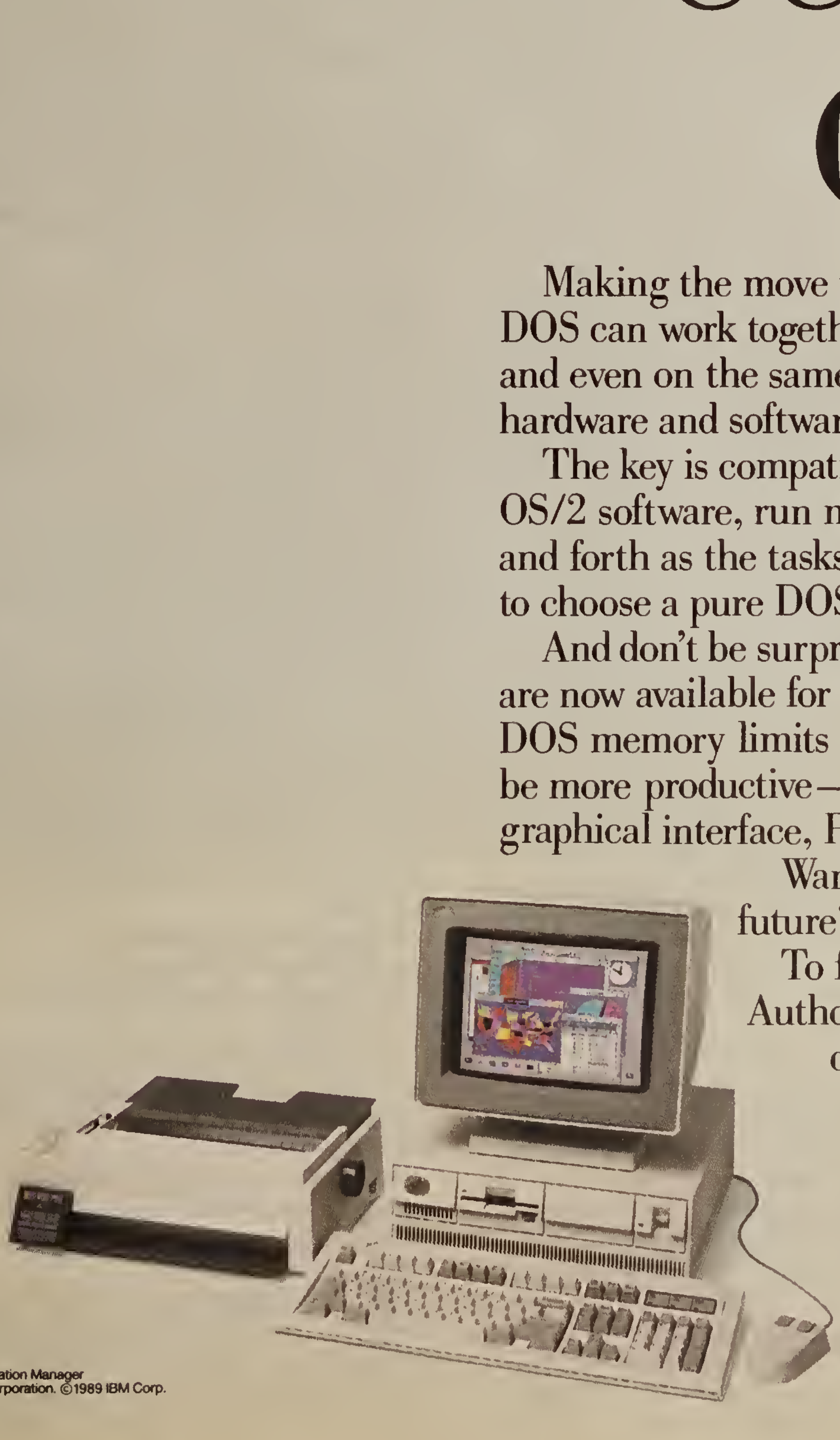

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COMPANY	PRODUCT	SINGLE OR MULTIPLE PROCESSOR(S)	INTERNAL CPU	BUS SPEED (BIT/SEC.)	MAX. TRANSMISSION SPEED (BIT/SEC.)	MAX. NO. TRUNKS IN SIMULTANEOUS OPERATION	MAX. THROUGHPUT (PACKET/SEC.)	MAX. NO. CALL SETUP/SEC.	MAX. NO. VIRTUAL CIRCUITS PER NODE	TYPES OF REDUNDANCY SUPPORTED	FRAME RELAY	INTERNAL PAD	PROTOCOLS SUPPORTED	NETWORK MANAGEMENT SYSTEM SUPPORTED	NETWORK MANAGEMENT FEATURES AND FUNCTIONS	THROUGHPUT DELAY FOR X.25 PROTOCOL (MSEC.)	BASE PRICE
Timeplex, Inc. (201) 391-1111	Timepac NP100E	Single	National Semiconductor 32016	NP	64K	20	100	50	800	CPU	No	Yes	X.25, IBM 3270, SNA/SDLC, BSC, asynch	Timeview	Graphics, configuration management, performance monitor, accounting/ billing statistics, fault isolation, distributed management	12-14	$4,000
	Timepac NP500	Single	National Semiconductor 32016	2M	128K	14	500	100	3,000	CPU	No	Yes	See above	See above	See above	4-5	$10,000
US Sprint Communications Co. (formerly Telenet Communications Corp.) (800) 835-3638	TP4/II-4800 series	Multiple	6502	NP	64K	128	4,000	40	4,000	CPU, bus, line sets	No	Yes	X.25, X.75, X.32, IBM 2780/3780 and QLLC, SNA/ SDLC, asynch, HASP	TP5/II Network Management System	Graphics, configuration management, performance monitor, accounting/billing statistics, fault isolation, distributed management	4-15	$25,000
	TP4/III High Performance Series	Multiple	68020	400M (2 buses of 200M each per model)	64K	512	11,000	250	20,000	CPU, bus, line sets	No	Yes	X.25, X.75, X.32, asynch	See above	See above	4-15	$96,000

Design tools take on networks of the '90s

BY GERALD RYAN

In the early 1980s, very few companies used software tools to plan and configure their networks. Now that the software is available on personal computers at a lower price, 60% to 70% of the Fortune 500 take advantage of these tools.

However, as network issues grow more complex, the available commercial software is looking less and less sophisticated, and the industry is preparing itself for yet a new twist in this niche market.

Traditionally, users have invested in commercial software to use in-house or turned to network vendors or consultants for these services. Each source offers its own advantages and drawbacks.

If it is the barest of configuration assistance you need, what the network vendors offer is probably enough. Most provide free design assistance to their clients when a purchase is made or a major reconfiguration done.

While this approach has certain advantages — for example, the ability to make proprietary routing algorithms and subtle performance characteristics integral parts of network design — it is also limiting in that the resulting network is inevitably biased toward one vendor.

Another drawback is that once the network is installed, the service usually stops. The vendor may offer one more go-round immediately after installation, but very rarely do you get a provision for ongoing changes or fine-tuning.

Recognizing these limitations, many companies seek less product-specific design and planning aids, either buying them directly or hiring the services of consultants who use such tools.

Most of the tools that are currently available range in price from $15,000 to $25,000 per single copy for PC-based systems. Prices can reach $75,000 and higher for mainframe- or minicomputer-based tools.

In general, the commercial design and planning products perform one or more of the following tasks:

- **Response-time modeling and analysis of centralized interactive wide-area networks.** This is usually accomplished through analytic modeling using traditional queuing theorems.
- **Least-cost configuration of multipoint or point-to-point leased-line data networks.** The software calculates a least-cost configuration based on user-entered design objectives such as response time, utilization limits, number of sites or terminals per circuit or number of transactions per port. The designer can usually select any mix of these five typical design constraints to drive a topology.

The software also allows the user to compare various tariff offerings and bridging arrangements that may have a large impact on network costs.

- **Tariff pricing to compare costs of alternative services.** There are several low-cost PC- and time-sharing-based systems that allow users to enter circuit details and compare prices of various tariff alternatives.

Tools that are designed to perform this last function are the most limited, since they seldom, if ever, handle performance or design calculations.

When buying commercial software, it is particularly important to make sure that the vendor provides training and in-depth, continual customer support. These tools are subtle, and the results they provide require careful interpretation.

The obvious advantage of commercial tools, whether direct or indirect, is that they provide both impartiality and day-to-day operational support.

But here is where the new wave crests. Networks have grown too complex for most tools available today. Enterprisewide, multifunctional, hybrid networks carrying voice, video and data require more than one protocol, experience many traffic patterns and can comprise thousands of terminals.

While today's WAN software tools are almost totally concerned with hierarchical network architectures, they will need to address the integrated enterprisewide network, complete with local-area networks, metropolitan-area networks and WANs. The interdependency of network elements must be considered in calculating performance, capacity, topology and pricing.

Before you buy commercial software, make sure the vendor plans at some point to provide tools that are capable of doing the following, either in the form of upgrades or logical extensions of their current offerings:

- Perform detailed performance calculations.
- Modify details of protocols used by software.
- Allow you to create your own telephone company tariffs and modify tariffs in the system rather than taking what is in the package without change.
- Download tariff information from the mainframe database to keep such information current.
- Graphics or mapping capabilities that allow you to visualize the network quickly.
- Define multiple traffic periods. This is important because throughout the day, you'll see several different traffic profiles.
- Import and export information to and from the model from things such as spreadsheets and data-capture mechanisms.

If development is not already in process, the vendor will most likely not have it until 1992 or 1993 — or won't have it at all. Chances are that the selection process will become faster as time goes on, because only a few companies will have the resources to provide tools for such complex networking needs. For that reason, it is important to consider vendor staying-power, along with product features. •

Ryan is president of Connections Telecommunications, a consulting firm in Brockton, Mass.

ASK THE VENDOR

When I connect Ethernets using T3 Technologies' Metrobridge system, much of the DS-3 bandwidth is unused. Are you planning any products that will allow me to use the extra bandwidth for other services?
Mike Ross
Customer systems engineer
New Brunswick Telephone Co.
Saint John, New Brunswick, Canada

T3 TECHNOLOGIES, INC.: Metrobridge uses the DS-3 channel to burst packets at a full 45M bit/sec. between bridges. This provides the highest performance possible in connecting Ethernet segments.

Moreover, up to 32 different Ethernet segments can be linked together, since we are running a multiaccess protocol on the DS-3 channel. We can also split the DS-3 backbone into two logical subnetworks.

We are also planning to provide different interfaces to the DS-3 channel. In particular, we are looking at a way to provide connectivity for 16M bit/sec. Token-Rings to complement our current 4M bit/sec. Token-Ring extension product.

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BE ABLE TO GROW
ALONG WITH YOUR COMPANY?

WILL YOU BE LOCKED OUT OF GLOBAL MARKETS
BECAUSE YOUR NETWORK ISN'T UP TO WORLD STANDARDS?

WILL YOU HAVE ENOUGH POWER TO DELIVER ISDN?

WILL YOU BE READY TO HANDLE VIDEO
WHEN USERS DEMAND IT?

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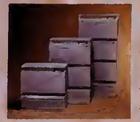

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TECHNOLOGY THE WORLD CALLS ON

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TECHNOLOGY THE WORLD CALLS ON

Crackdown on software pirates

Industry watchdogs renew efforts to curb illegal copying

BY JANET MASON

Software piracy wears a reputation of cloaked intrigue — Dick Tracy tracking down illicit retail operations on crowded Hong Kong streets and corporate bad guys churning out pirated disks for companywide use.

Less notice has been paid to the casual pirate — the well-meaning employee who replaces the company-issued word processing program with his own and then allows co-workers to copy it. Or the staff member who pirates company disks for home use.

But more and more, both types of pirates are finding that they are risking more than just a guilty conscience by illegally copying software. Corporations, computer dealers, rental operations, universities and bulletin boards are increasingly being taken to task by software industry watchdogs.

In recent months, industry trade associations have begun stepping up educational and prevention efforts as part of an antipiracy crusade. Groups such as Adapso, a Washington, D.C.-based computer and software services association, Software Publishers Association (SPA) and Business Software Alliance (BSA) have been consulting retailers and the publishing industry on how to avoid copyright infringements.

Moreover, the maturing software industry has begun to initiate the same protective steps taken by other intellectual property industries, such as movie, record and book companies, according to legal experts.

"In the past 20 months, [SPA] has brought 30 lawsuits against offenders," says Mary Jane Saunders, SPA general counsel and an attorney who handles domestic piracy issues (see story page 115).

"The SPA has plastered the world with brochures to inform people that piracy destroys the valuable resource of commercial software," says Donn B. Parker, a senior management consultant at Menlo Park, Calif.-based SRI International, Inc.

The general notion of software piracy as an unethical practice is being driven home by expensive lawsuits brought against major corporations and other offenders pirating software.

Although those who make illegal copies are rarely prosecuted, purchasers of large amounts of illegal software can receive a $50,000 fine under U.S. Code Section 17 Copyright Law.

With the help of an amended trade act, international strides have been made in closing the doors of illicit retail and mail-order software operations in the Far East and filing lawsuits against European corporate infringers.

Counterfeits abound

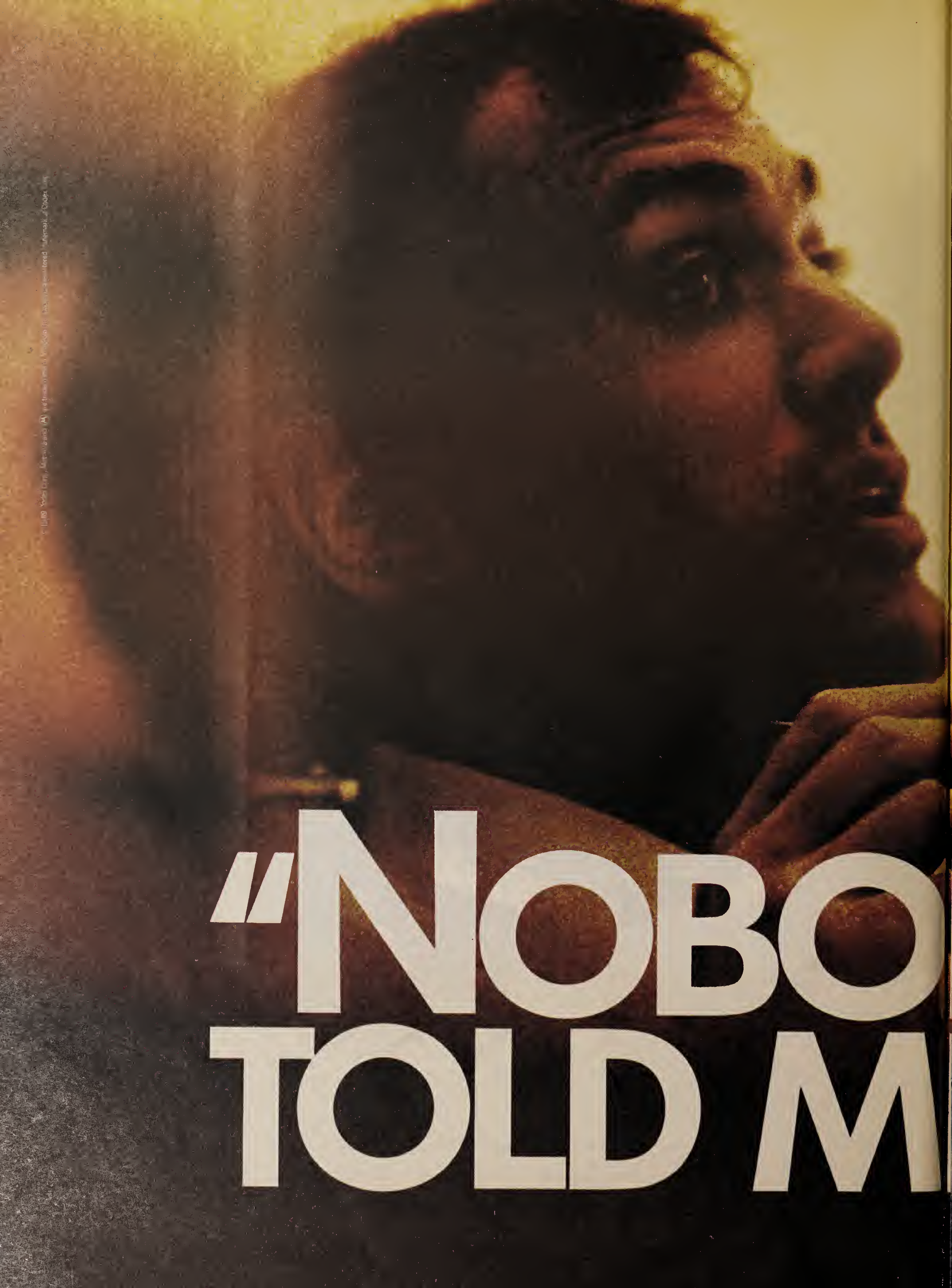
Software vendors say they are fighting for their very existence in moving against piracy.

In what he deems a conservative estimate of the amount of U.S. illegal software in circulation, Peter Beruk at SPA says that "for every legal software

Kerry Gavin

Mason is a Philadelphia-based freelance journalist.

- U.S., foreign offenders eyed
- Annual losses estimated at $4.1 billion
- 'Piracy destroys legal software'



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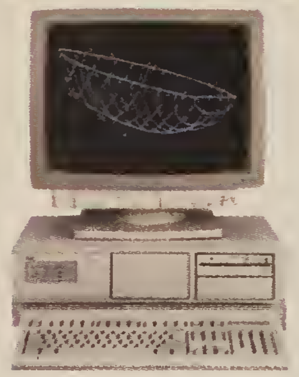

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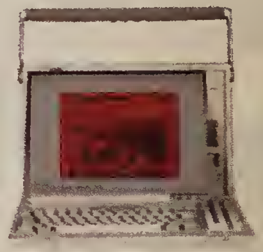

PowerMate Portable SX

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package in use, there is another illegal one."

Some say that that number is as high as five illegal copies for every legal one, adds Beruk, who is a litigation project manager at the Washington, D.C.-based association.

Adding fuel to the fire are state agencies, which have found — in a precedent-setting court case involving the University of California at Los Angeles — that they are currently exempt from U.S. copyright law. And rental operations, both legitimate and those renting pirated disks, are under increasing scrutiny. Along with personal computer software, which is easily copied, cumbersome mainframe software has also had piracy problems, though more rarely.

SRI's Parker defines software piracy as a "crimoid" in the sense that it is one of a string of hot computer news topics that include invasion of privacy, hackers and computer viruses.

"It became a crimoid in the early 1980s," Parker explains. "At that time, [software piracy] was seriously threatening the computer industry to the extent that it was about to destroy it."

For software vendors, the intrigue of piracy translates into stark bottom-line losses. Worldwide hardware and software losses from copyright infringement total $4.1 billion annually, says Tom Sherman, an analyst at the U.S. International Trade Commission.

Since then, software companies have tried a series of technological solutions, such as, most notably, disks that cannot be copied, which were "all thwarted by an army of hackers," Sherman claims.

Warning shot fired

Corporations received a warning last June when Facts on File, Inc., a New York-based publishing company, reached a six-figure out-of-court settlement with five software vendors that, with the help of SPA, filed a suit on the grounds that the company had copied their programs.

The case was the first to be filed by multiple vendors against a corporation. SPA has also settled four other corporate piracy cases out of court with the provision that the organizations' names would not be released. Currently, the association has six cases pending against corporations.

As a result of the Facts on File case, a major accounting firm posted articles pertaining to the lawsuit on bulletin boards in all of its corporate locations with a memo from top management saying, "Don't let this ever happen to us." SPA's Saunders points out that the same firm encourages its clients to have corporatewide piracy contracts and audits.

SPA has pursued informal corporate software audits with two dozen companies to avoid the expense and embarrassment associated with lawsuits. With the company's cooperation, SPA sends in its own investigator to compare installed software on hard disks with corporate purchasing records.

"When we find pirated software," Saunders explains, "the company has to destroy it, pay us a penalty — which is less than if we had taken them to court — and then buy legal copies of the software."

He says that his organization has found that if a company does not pay attention to software — despite its policies — it is likely to get pirated. SPA usually suggests a corporate audit when it finds a company with an unenforced corporate software policy. The association also provides a self-imposed contract and audit program for companies.

Policy needed

Parker emphasizes that a corporate effort against software piracy starts with an organizational policy, backed up with software audits and followed up by swift punishment of offenders.

The contract, which Parker suggests employees should sign once a year, should state that, "We, as a company, do not engage in software piracy, and our purchasing function should pursue site licenses and larger scale purchasing."

Parker says the contract may help the company in a lawsuit — provided that the policy has been enforced. His recommendations come through SRI's Information Integrity Institute, which acts as a clearinghouse for 50 major companies to share information on computer security, including piracy.

Parker also suggests that companies code their disks by buying corporate disks in a certain color or brand so that

Copylefts vs. copyrights

Mention software piracy to Richard M. Stallman, and you're in for a novel response. "What's that?" he'll ask. It's an unusual reaction for somebody entrenched in the software industry. However, given Stallman's background — programmer, computer industry outlaw and MIT's "last hacker" — his answer is far from surprising.

"Software licensing is antisocial, because it keeps information away from your neighbors," Stallman says, "and it prohibits the growth of the technology."

Stallman refuses to use any licensed commercial software and has spent hours in a cramped MIT laboratory developing programs that enable users to view the source code and improve on it if they wish. Based on the hackers' creed that all information must be free to further collective societal knowledge, he has founded The Free Software Foundation as a legal alternative to copyrighted software.

Housed on MIT's campus, the foundation provides "copylefts" that ensure programs are freely distributed and not incorporated into for-profit programs. Despite its renegade attitude, the foundation is supported by some corporate heavyweights. The Next, Inc. computer comes bundled with the software. Other firms, including Hewlett-Packard Co., Bull H. N. Information Systems, Inc., Nynex Corp. and NCR Corp., support the foundation.

The programs — which run on Digital Equipment Corp. VAXs, other minicomputers and Intel Corp. 80386-based personal computers — are not exactly free. They are sold on magnetic tapes that cost $150 plus shipping and handling. However, as Jay Fenlason, one of the foundation's two full-time programmers, says, "Our primary purpose is to develop software, not to make tapes, so we try to discourage people from buying tapes and instead make copies from their colleagues."

The foundation distributes an entire development system that ultimately will include applications for both programmers and nonprogrammers and an operating system that reportedly rivals Unix.

Currently, the most popular program is an editor called Emacs. The foundation also distributes a widely used compiler, and programmers are working on a spreadsheet product.

Despite the high level of corporate backing — which, along with individual contributions, supports the foundation — not everyone is pleased with what the group stands for.

One commercial software analyst accuses Stallman of creating an operating system designed "to put Unix out of business." Stallman counters this by explaining that he is simply creating a program that people need, which will further society by encouraging the spread of knowledge.

However, there are those who could not disagree more with Stallman's views. Legal threats aside, opponents say that pirating software carries repercussions that can damage the productivity of an entire industry and individual users.

Mary Jane Saunders at Software Publishers Association (SPA) argues that software piracy negatively affects all users by driving up prices and diverting funds used for research and development.

Saunders, who is general counsel at the association, says that about 15% to 20% of corporate profits are returned to R&D, which later benefits customers in the form of software product updates and new versions. "If vendors don't have the revenue to match distribution of their products, they don't have much to return to R&D," she says.

Ultimately, piracy could result in fewer new products introduced to market, she says. "If people are stealing vendors' property, there is no incentive" to develop new packages, she claims.

Immediate repercussions of using pirated software include the lack of documentation and technical support. "In the short term, you get the program," says Peter Beruk, SPA's litigation project manager, "but you won't receive documentation or be able to call the support number without a serial number."

JANET MASON

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employees can distinguish between corporate and personal property. "This way," Parker says, "employees are aware that they are engaged in illegal activity with company materials."

Saunders says that "there are people in corporate America who understand copyright law." Many of them are among the 20 callers who contact SPA's piracy hot line every day and are willing to sign an affidavit about piracy in their companies.

People who call the hot line include former employees, consultants and, in one case, a temporary secretary. This secretary, who writes novels in her spare time and, as Saunders observes, "is concerned with protecting her own intellectual property," reported three piracy incidents at separate companies.

Dealing with dealers

Along with tracking corporate abuses, SPA also investigates calls about computer dealers and bulletin boards. In most cases, SPA tries to settle out of court on behalf of the 565 software vendors it represents. However, Saunders explains, there are many cases in which litigation cannot be avoided. In a current case, SPA has been forced to take a California computer dealer to court even though the dealer contends that "the only time it ever loaded a hard disk with free software was when our [SPA] investigator was there."

SPA has filed suits against 10 computer dealers, and its efforts and corporate awareness programs may be paying off with fewer lawsuits.

Recently, an SPA investigator checking a report of piracy in a Florida dealership found no evidence of piracy in two dozen other area stores. "A year and a half ago," Saunders says, "he would have found at least half of them doing something illegal. This time, he even found our brochures in some of the stores."

As for bulletin boards, although the association has pressed charges against five systems operators, the group tends to warn those involved rather than filing suit. "If we wanted to, we could file 10 suits a day" against bulletin boards, Saunders says. Instead, the association contacts the systems operators to let them know they will soon be monitored, thus giving them a chance to remove pirated software.

Even fears of contracting viruses has not discouraged many bulletin board users from picking up duplicated software.

Software rental firms are another target of industry watchdogs. Firms renting software, even if it is a legal operation, exacerbate software piracy, says Ronald Palenski, general counsel of Adapso.

To curtail this threat, legislation is under consideration by the House and the Senate that will give software vendors the right to restrict rental of their software. If it passes, the legislation, which mirrors rental restrictions for record companies, places the onus of risk on the vendor. This will mean, in effect, that software vendors themselves will decide if their software can be copied.

One got away

Despite trade association efforts, the piracy picture is not completely clear. A precedent-setting case — and one that has aroused the ire of the software industry — is one in which state agencies were allowed to pirate software without paying damages.

BV Engineering v. *the University of California at Los Angeles* was first brought to district court in 1987, decided in 1988 and denied a hearing by the U.S. Supreme Court in 1989.

The case determined that the owners of BV Engineering, whose software had been pirated by the engineering department at UCLA, had no standing to sue for damages. The difference between the state and others, Saunders says, is that the state can receive an injunction to stop the piracy but is not currently liable for damages, court costs and attorney's fees.

Concerned that other state agencies will be encouraged to pirate software, last year industry advocates introduced remedial legislation to the Copyright Act of

How to spot pirate software

To determine whether advertised software is pirated, it is best to use the adage that "anything that sounds too good to be true probably is," says Peter Beruk at Software Publishers Association (SPA).

The first telltale sign of pirated software is the price. Most major software programs advertised for less than $200 are probably illegal, Beruk says.

The second warning signal is the location of the mail-order house. "Stay alert for Hong Kong, the Middle East and the Far East," warns Pilar Cloud, executive assistant at Washington, D.C.-based Business Software Association (BSA). Once a catalog is received, consumers can call vendors' regional representatives to find out whether the source is a authorized distributor.

Because unauthorized duplication of software costs, vendor associations encourage wary consumers to contact them to obtain more information or report suspected piracy.

BSA can be reached at 202-737-7060; SPA's piracy hot line is 1-800-388-PIR8.

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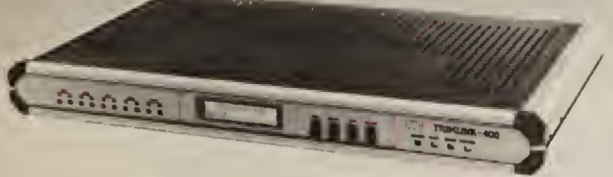

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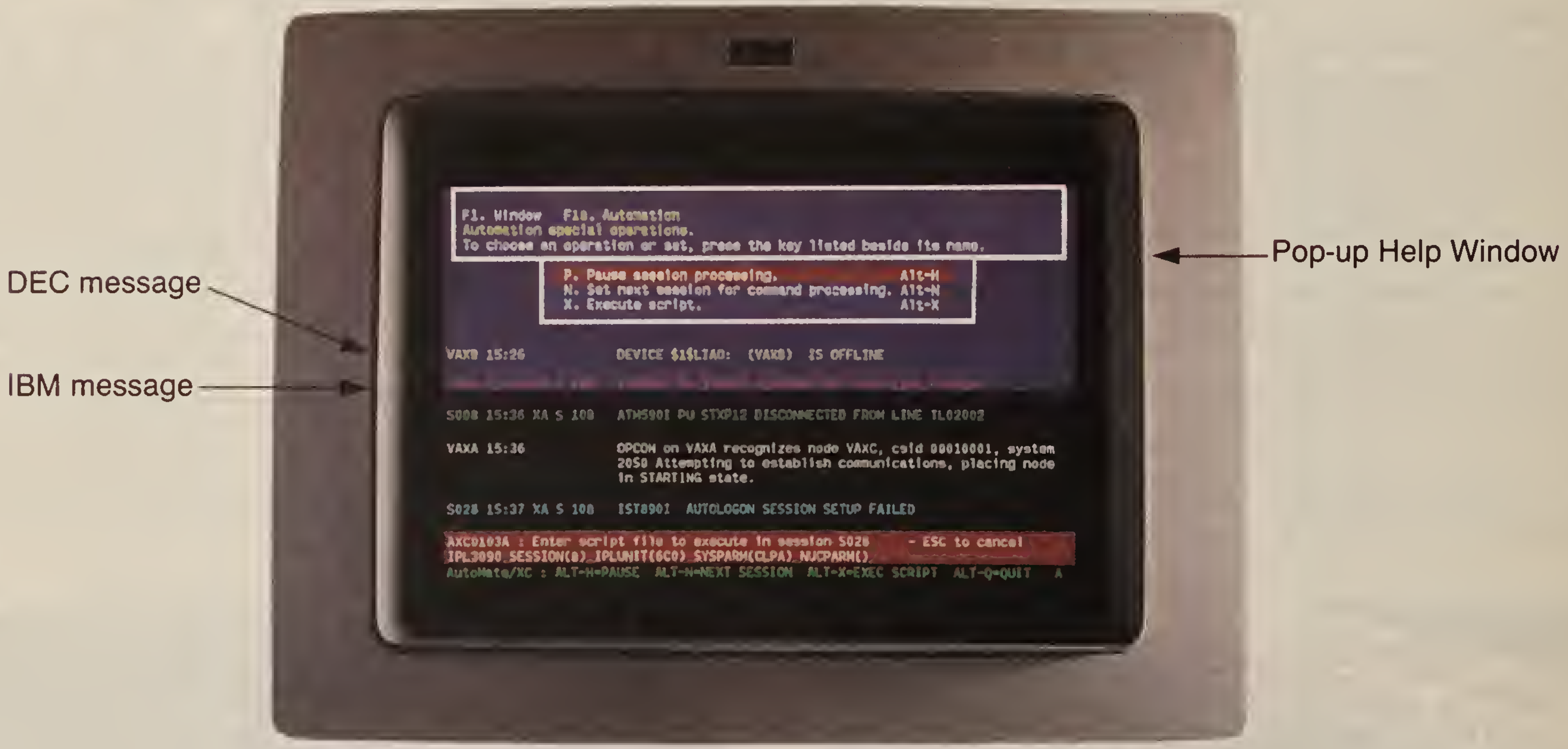

```
F1. Window   F18. Automation
Automation special operations.
To choose an operation or set, press the key listed beside its name.
        P. Pause session processing.                    Alt-H
        N. Set next session for command processing.     Alt-N
        X. Execute script.                              Alt-X

VAXB 15:26            DEVICE $1$LIA0:  (VAXB)  IS OFFLINE

S008 15:36 XA S 108   ATM5901 PU STXP12 DISCONNECTED FROM LINE TL02002

VAXA 15:36            OPCOM on VAXA recognizes node VAXC, csid 00010001, system
                      2050 Attempting to establish communications, placing node
                      in STARTING state.

S028 15:37 XA S 108   IST890I  AUTOLOGON SESSION SETUP FAILED

AXC0103A : Enter script file to execute in session S028      - ESC to cancel
IPL3090 SESSION(8) IPLUNIT(6C0) SYSPARM(CLPA) NUCPARM()
AutoMate/XC : ALT-H=PAUSE  ALT-N=NEXT SESSION  ALT-X=EXEC SCRIPT  ALT-Q=QUIT   A
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1976 to the U.S. Congress. The goal, Palenski explains, "is to close the state agency loophole."

Dave Eskra, chairman of both Adapso and Pansophic Systems, Inc., in Lisle, Ill., testified before the Senate Subcommittee of Patents, Copyrights and Trademarks that since the decision, it has become harder to close deals with state agencies on mainframe software sales because the agencies have no incentive to license the product.

MINI POLL

Handling a tough issue

How do you handle the sticky issue of illegal software duplication? We asked that question of some IS chiefs:

DONALD WHITTINGTON
MIS Manager
Michigan Sugar Co.
Saginaw, Mich.

We have a written policy that forbids unauthorized copying. However, having the policy is one thing, enforcing it another. In many cases, it's hard to track the originator, and what can you do if someone comes in after hours and makes copies?

If we did find employees copying software, we'd warn them against continuing to do so. I've found, however, that since we've put our policy in writing, illegal copying has not been a problem.

CHRIS PORCH
Vice-President
Computer Operations
Pacific Century Advisors
San Diego

We do not have a formal policy for dealing with duplication, but being part of a large bank — Security Pacific Bank — we've got auditors in here once or twice a year to take inventory of the hard drives. The much larger issue we're worried about is viruses. But I do warn people that pirating software is not condoned. It's not the individual that will get fired, it's me. Large organizations like ours could get stiff penalties if copying occurred. I think the courts are geared toward hanging corporations.

We buy a lot of software, and I think site licenses for corporations our size would go a long way in helping us combat piracy.

ALLEN HEAD
Manager
Information Services
Universal Flavor Corp.
Indianapolis

We have a formal company policy stating, "Thou shalt not duplicate software," and that policy is well-enforced. If we catch someone a first time, we'll warn him. For a second offense, we'd have to take more drastic action.

People are not restrained from buying software for their work. If they need Lotus' 1-2-3, we'll buy it for them. That encouragement helps deter software piracy.

Palenski says he expects the legislation to be passed in early 1990, thus thwarting piracy by state organizations, although, he adds, "In this town, I wouldn't be surprised by anything."

Foreign piracy

Beyond U.S. shores, software pirates on both halves of the hemisphere have been thick as thieves. The retail and mail-order piracy market in the Far East has recently been compounded with corporate piracy cases in Hong Kong. In Europe, corporate piracy has become widespread in certain countries.

Spurred by a maturing microcomputer base in foreign countries and amendments to the Trade Act, the software industry has linked hands with the book publishing, recording and motion picture associations under the auspices of the International Intellectual Property Alliance (IIPA), formed in 1985.

Before 1984, the Trade Act contained provisions that provided duty-free entry of goods normally tariffed into developing nations. It also did not expressly protect copyrighted intellectual property of any sort.

With a mature market in installed bases of microcomputers, videocassette recorders and inexpensive copying technology, the heads of intellectual property associations found rampant copyright infringements during a trip to the Far East.

Hence, the allied industries filed a report with the U.S. Trade Representative office, which passed an amended Trade Act explicitly to protect intellectual property in foreign countries. If the countries do not comply, the U.S. Trade Representative has the right to invoke trade sanctions.

The IIPA and its individual members, including BSA, have been working in tandem with the European Commission (EC) on a software protection directive.

If adopted, the directive will require the 12 EC member states to amend their laws to protect all software used in their country. The EC's Parliament and the Counsel of Ministries are expected to consider the directive in the first quarter of 1990.

"Essentially, it will protect the concept that when you open a shrink-wrapped package of software, it implies that a contract has been entered," says Douglas E. Phillips, president of BSA in Washington, D.C.

Recently, BSA has filed several suits in France and Italy and has issued a warning in Spain. Last April, in a raid of Montedison, an $11 billion Italian corporate conglomerate, investigators found that 90% of Lotus Development Corp. and Ashton-Tate Corp. software was illegally copied. Nine months later, the case is still in progress.

Two French companies, against which BSA filed suit last October, include Telediffusion de France, a provider of transmission services to the broadcast media, and Banque Paribas, a financial institution.

In Spain, BSA has tried different tactics by announcing to the press that the group is planning to conduct a raid against a major Spanish corporation. "Every company in Spain could potentially be raided," Phillips says, "so this is a warning to them to stop using pirated software."

Casualties of war

Recent events in the war on piracy:

- The Business Software Association (BSA) initiates criminal proceedings against Mapfre Vida, a Spanish insurance firm, for alleged illegal software copying. *Jan. 8, 1990.*
- BSA announces legal action against Fox, S.A., of Barcelona, Spain, for copyright infringement stemming from alleged use of unauthorized copies of software made by Ashton-Tate Corp., Lotus Development Corp., Microsoft Corp. and Wordperfect Corp. *Dec. 14, 1989.*
- National Institute of Justice publishes a new resource manual on computer crime. It is aimed at helping auditors, security experts and criminal justice agencies combat various computer crimes, including piracy. *Dec. 1, 1989.*
- Singapore police and BSA raid five targets of suspected software piracy. *Nov. 24, 1989.*
- BSA announces it will take legal action against a Hong Kong piracy syndicate that allegedly copied $50 million worth of programs and manuals. *Nov. 17, 1989.*

Phillips hopes this strategy works, because, as he points out, BSA members — which include Aldus Corp., Ashton-Tate, Autodesk, Inc., Lotus, Microsoft Corp. and Wordperfect Corp. — "are in the business of developing software, not litigation."

In the Far East, cases have been filed in Hong Kong, Taiwan and Korea, among other countries. And BSA is working with the People's Republic of China to enforce stronger copyright laws.

Pirated ship comes in

The biggest success story, perhaps, is Singapore. Phillips reports that a year ago, "pirated software was carried by plenty of retail stores." After raids and lawsuits against six major retail outlets and an uncovering of an international mail-order operation, he says, the pirated software trade has really dried up.

By working closely with international governments and trade associations to avoid "being seen as Americans coming in and telling people how to behave," Phillips says he is confident that international piracy will continue to be stymied.

To think that piracy will be completely eliminated is unrealistic. A more attainable goal is to have it perceived as risky conduct.

"We want to get to the point," Phillips says, "where stealing software from the store and copying it are seen as the same thing." •

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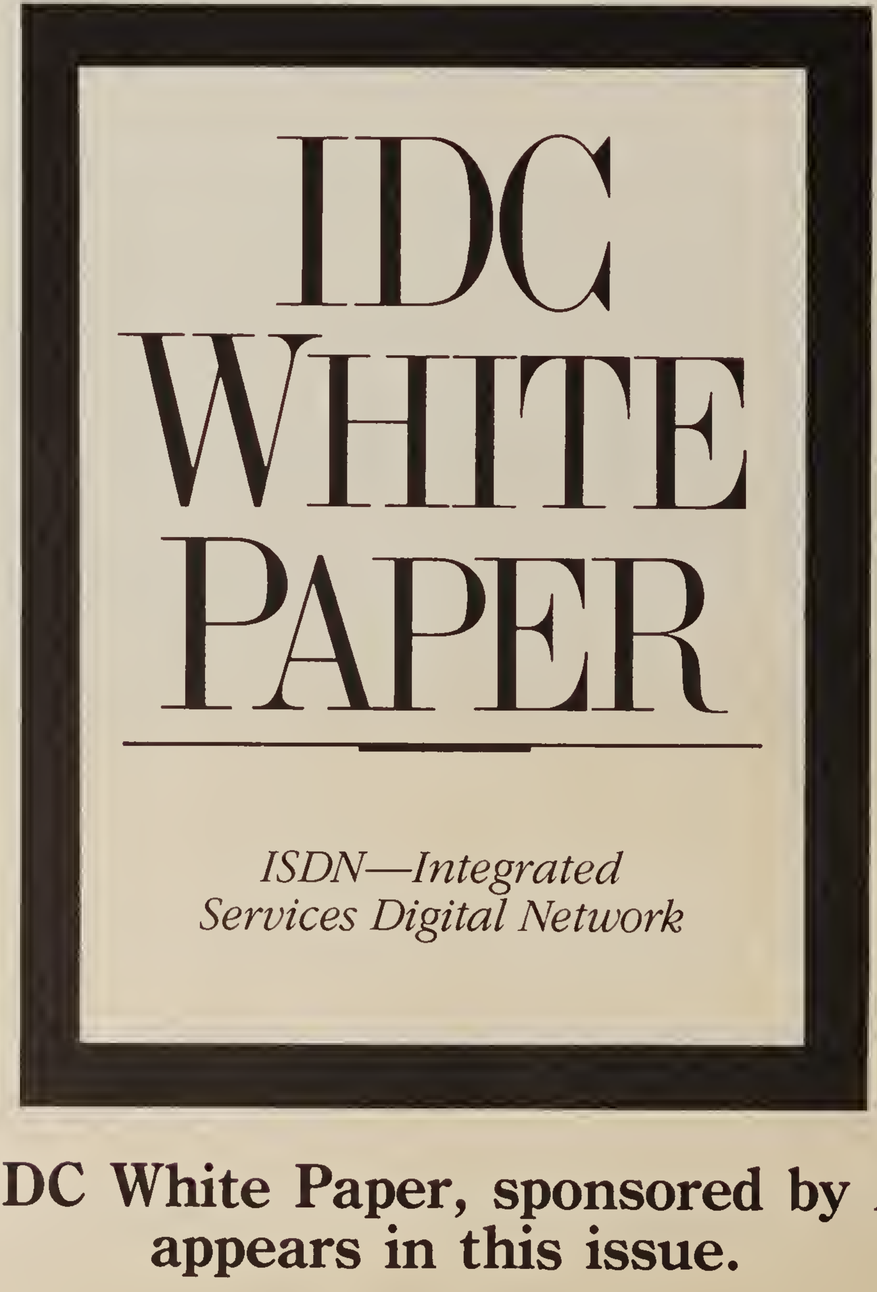

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INDUSTRY
INSIGHT
Andrew Mohr

DOD goes on an ADP diet

Melting Cold War tensions and the omnipresent federal deficit are conspiring to reduce the U.S. Department of Defense's (DOD) budget after a decade of increased expenditures. Instead of growing steadily each year, the DOD's forced diet will undoubtedly dampen its appetite for automatic data processing (ADP).

Optimists speculate that the DOD will need automation to replace and enhance reduced manpower, training and support functions. The argument goes that with troop and staff reductions in the offing, the DOD will buy more ADP products to replace these lost souls. Don't bet on it. Even if ADP is used to fill some gaps, ADP buys will still decrease overall with the decline in the DOD's war chest. The best one can hope for is that the rate of decline for ADP buys will fall less than the budget cuts in general.

In a world of decreased spending, the DOD's divisions are already battling for scarce resources. ADP is competing on all fronts with arms development, support, manpower and management. While ADP is a

Continued on page 122

Customer care clinches Stratus success story

BY MARYFRAN JOHNSON
CW STAFF

MARLBORO, Mass. — Every Friday at 8:30 a.m., the glass-walled conference room overlooking Stratus Computer, Inc.'s elegant lobby becomes William Foster's "war room."

The chief executive officer's first order of business never varies. He asks his five senior vice-presidents to report on "the customer situation" worldwide.

Were there any power interruptions? Any outages? Any earthquakes? Did anything, anywhere, cause Stratus' fault-tolerant, never-fail computers to let a customer down?

"Foster takes this very seriously. It's like a war room," said Paul Tucker, senior vice-president of sales. "One of us always leaves that room with the responsibility to address the situation and report back."

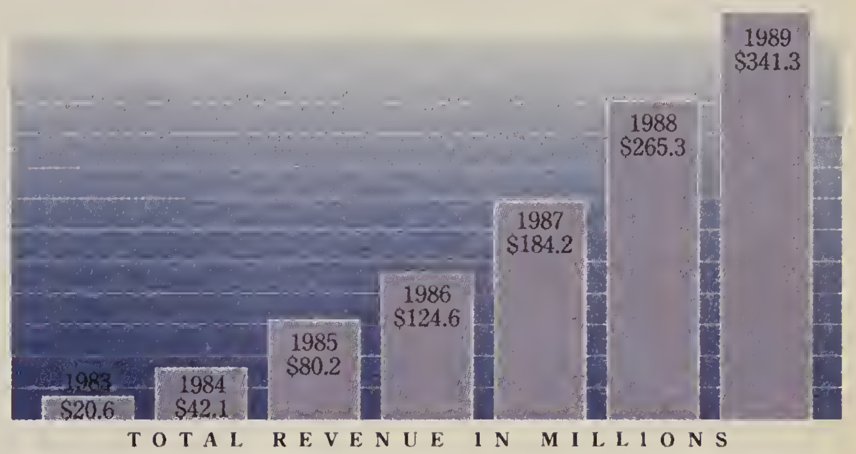
Those Friday morning meetings are one clue to the success Stratus has enjoyed during its 10-year history. Launched with $14 million in venture capital in 1980, Stratus stands among the few survivors of the would-be competitors aimed at Tandem Computers, Inc. in Cupertino, Calif.

Today, Stratus and Tandem are often mentioned in the same breath, having sewn up 90% of the fault-tolerant market between them, according to International Data Corp., a market research firm in Framingham, Mass.

"Stratus is a beacon of hope in a terrible landscape," said David Wu, a computer industry analyst at S. G. Warburg and Co. in New York, referring to the company's current exemption from the blight that seems to be swamping many of its high-tech neighbors along Massachusetts' Route 128.

Continued on page 120

Growing by leaps and bounds
Since going public in 1983, Stratus Computer has made some stellar strides



SOURCE: STRATUS COMPUTER, INC

CW CHART: MARIE HAINES

MCI buys Infonet's place at telecom table

BY ELLIS BOOKER
CW STAFF

With its January acquisition of Computer Sciences Corp.'s remaining 25% stake in Infonet, MCI Communications Corp. has bought itself a seat at the table of European telecommunications in 1992, analysts said.

Infonet, formed in January 1970, is an international X.25 packet-switched network service provider jointly owned by several European and Asian telecommunications administrations. From its offices in 34 countries, Infonet provides integrated computing and communications services in the U.S. as well as 100 other countries.

"We intended to hold onto the share, but we were approached by MCI, which offered a good return on investment," said a CSC spokesman from the firm's headquarters in El Segundo, Calif. CSC distributed another 5% of its holdings among nine of the 10 Infonet partners. In December, the 10th partner, Japan's Kokusai Denshin Denwa Co. Ltd. (KDD), purchased 5% of CSC's original 35% holding.

Stronger bonds

MCI officials, meanwhile, predicted Infonet's relations with these and the other Postal Telephone and Telegraph (PTT) authorities would strengthen MCI's international business.

Analysts agreed.

"Some serious companies are on [Infonet's] board of directors," said Eric Arnum, editor of "Electronic Mail & Microsystems," a newsletter based in Forest Hills, N.Y. Arnum also noted that Infonet's European support operation could be especially valuable to MCI, which has been trying to push its electronic mail offering there of late.

The E-mail connection is particularly well-timed. Only last month, Infonet announced Notice 400, its first X.400 service. Infonet said the personal computer-based service will be followed by a local-area network offering and a LAN-to-host X.400 product. Infonet also said it would begin seeking X.400 interconnection arrangements with other network providers, including its shareholder PTTs.

In a related development, Infonet in December rolled out a pilot electronic data interchange (EDI) service. "If Infonet has a role in 1992" with trans-European EDI services, Arnum reasoned, "so does MCI."

Although CSC has divested itself financially from Infonet, it said it will continue to use the firm to satisfy the integration needs of its customers, particularly those with international operations. MCI and CSC pledged to continue work on computer and systems integration.

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The Digital Standard

Stratus

FROM PAGE 119

"Both [Stratus] and Tandem are fundamentally the only two companies ahead [of the pack] in on-line transaction processing, serving the fault-tolerant part of that market," Wu said.

Stratus grew from 100 employees to 2,100, posting 1989 sales of $341.3 million — a respectable 29% growth over the previous year's revenue. The firm also hauled in 136 new accounts this past year, more than doubling the 60 new accounts signed up in 1988.

Industry analysts and customers cited several interlocking keys to that success: a clearly focused strategy, a stable management team that still includes the three company founders, a highly reputed customer service and support organization, a thriving relationship with its resellers and leading-edge technology.

Much like the folks who "do chicken right," Stratus focuses its expertise in the complex, specialized area of on-line mission-critical computing. Such systems handle the make-or-break applications that control military communications subsystems or transmit financial data to Wall Street securities firms.

Presently, the company message is broadening slightly to emphasize the importance of never-fail systems in business competition.

"More and more of our buyers are not traditional MIS people, but users themselves," Tucker said. "It's not lines and feeds and speeds they care about. It's how do I get my cash from here to here?"

The overall OLTP market is estimated by various industry-watchers at $10 billion to $30 billion annually, making it one of the few serious sizzlers left in a largely lukewarm industry. The OLTP niche that belongs to continuously available systems is estimated conservatively at $2 billion now.

"More and more businesses are putting corporate databases on these machines," said Wu, who along with other analysts predicted that this $2 billion market will increase fivefold within the next decade.

Therein lies the rub for Stratus officials, who are intent on changing the market's perception of their company. "Fault tolerance is a feature, not a niche," Tucker said.

Steve Sherman

Foster *battles customer dissatisfaction*

Then again, that "feature" is Stratus' claim to fame, just as maintaining superior technology is critical to its survival.

"I grew up in the minicomputer business, and I've seen companies rise and fall," Foster said. "There's a common reason why a company falters: It falls behind on technology. We pay attention to that at Stratus."

Where his company has "stutter-stepped" a bit, Foster acknowledged, was in its late-to-market debut this spring of the Unix operating system for its entire product line. Another weak spot was the company's sluggish expansion into Japanese and European markets.

Yet international growth in the financial markets plus emerging opportunities in retailing, networking and telecommunications may end up tipping the balance in Stratus' favor, analysts said.

Robert Cameron, an industry analyst at Dataquest, Inc., said he would like to see Stratus repackage its line with fault tolerance added as a "come on." "Any online system has to crash just once, and you'll give your eyeteeth for fault tolerance."

A gorilla's shadow

The five-year alliance between Stratus Computer, Inc. and IBM, which sells the Stratus box as an IBM System/88 and accounts for at least 30% of Stratus' revenue, brings to mind the old joke about where a 500-pound gorilla sits: Anywhere he wants.

Can the smaller company shape its own destiny in the shadow of a $60 billion behemoth?

"The one sure thing is that something will inevitably change in that relationship, but it just doesn't pay to guess what that will be," said Hambrecht & Quist analyst Neil Weintraut.

Analysts say they believe Stratus' best protection may be its technological edge. The hardware-based fault tolerance was built into the Stratus architecture from the ground up — a feat that IBM cannot accomplish without substantially changing its own architecture.

MARYFRAN JOHNSON

A tale of a few rats

A favorite company legend at Stratus Computer begins with an overlooked computer part and ends with a family of rats.

As the story goes, the new manager of a New York hotel came upon a dusty old Federal Express box one day. Inside was a 1-year-old processor board for the Stratus computer running the reservation system from the hotel basement.

The manager called in his Stratus sales representative, and together they opened the cabinet door to find a startled nest of rats inside the machine, while the remaining processor hummed along without a glitch.

"Stratus is legitimately proud of their remote service and support capabilities," said Robert Cameron, an industry analyst at Dataquest, Inc. Those capabilities include sophisticated remote diagnostics, a 24-hour-a-day network of customer assistance centers and easily replaceable component parts.

MARYFRAN JOHNSON

Apple attempts to put the squeeze on leaks

BY PATRICIA KEEFE
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. is determined to crush the historical tendency of the Macintosh community to spill its guts about unannounced products and projects to one another and the press at the slightest provocation.

So much so that after successfully muzzling one information leak, Apple President Jean-Louis Gassee late last month issued an open letter to the Apple development community about the investigation and the company's strong views on unauthorized disclosures.

According to Apple, keeping proprietary information secret is the key to moving the computer industry into the 21st century. "[Stopping leaks] is extremely important to us, and we will take all reasonable precautions to prevent similar leaks from occurring in the future," Gassee said.

Confirmed suspicions

The letter refers to Apple's success in tracking down the source of an article about the then unannounced Mac IICI that appeared in an unnamed publication in July 1989.

Apple took its suspicions to Rasterops Corp., which later determined that an employee had indeed breached its nondisclosure agreement. (The IICI shipped in September 1989).

After reaching a confidential settlement with Rasterops, Gassee decided to publish the letter in hopes that "this incident will encourage the Apple community to join us to ensure better protection of confidential information and new ideas which will drive the computer industry forward." The letter was co-signed by Rasterops President Kieth Sorenson.

The undisclosed settlement with Rasterops was characterized as "an example of [Apple's] seriousness and dedication to protecting confidential information."

Rasterops has since increased internal security measures by installing cameras at building entrances and exits, installing secure offices and labs and beefing up its security patrol. Over at Apple, additional procedures for tracking loaned preproduction hardware were implemented.

Another — and potentially more dangerous — threat to Apple security reared its head last year, when a group calling itself the Nu Prometheus League threatened — but so far has failed — to give out proprietary Apple code to the public.

Page turns in copyright law with Adobe typeface ruling

BY CHARLES VON SIMSON
CW STAFF

MOUNTAIN VIEW, Calif. — Adobe Systems, Inc. has received the first copyright registration for a typeface program in the U.S., the company announced recently. While the registration is not likely to change the competitive positioning in the font market, it does represent a substantial improvement in protection of fonts as intellectual property.

Robert Holmgren

Adobe's Warnock

"We now have a protectable corporate asset," said John Warnock, chairman and chief executive officer of Adobe.

Prior to the announcement, the opinion of the U.S. Copyright Office was that computer programs were copyrightable, with the exclusion of those that described typefaces. The latest opinion reverses that situation but includes some significant technical subtleties.

Outline fonts, such as the newly copyrighted Adobe Type 1 format, are composed of executable computer programs. The copyright on an outline font covers only the code that describes the font, not the actual shape of the letter or number described. Bit-mapped fonts, which are composed of only data describing where points are plotted in forming a character, remain outside the protection of copyright laws.

The Jan. 5 ruling will protect Adobe and other outline font developers from piracy but does not give the firm much competitive advantage. Although Apple Computer, Inc. and Microsoft Corp. have not announced their plans for the joint development of Apple's Royal Font technology, observers agreed the code they use is not likely to be like the copyrighted Type 1 Adobe format.

"Apple has a basically different philosophy on how to write font code," said Pat Marriott, director of marketing at Adobe.

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Mohr

FROM PAGE 119

component of all these sectors, it will most likely take a backseat to more glamorous and well-entrenched interests.

The effects of the DOD's cuts are already being felt. ADP projects have been canceled or reduced for personnel/manpower programs that, with forced reductions in sight, are now less important. The ADP portions of arms programs are being wiped out as these programs are reduced or eliminated. With arms programs trimmed, the ADP normally bought to support spares and maintenance programs is being cut down as well.

Of course, certain niches will grow despite cuts. Hot items — lately, personal fax and other upgrade boards, local-area networks and telecommunications equipment — should number among them. Also, with less money for war games in the field, ADP simulations will prosper. Overall, however, these will remain exceptions.

With the budget cuts looming, ADP defense contractors are scrambling toward civilian agencies and the commercial sector. Some of the money cut from the DOD may show up in the "peace dividend" at civilian agencies. Firms long reliant on the DOD are already looking to environmental and energy contracts to supplement expected DOD reductions, since budgets in these areas may grow in response to public demand.

The shift from the DOD to civilian agencies is not without dislocation, however. The move is now taking its toll on small to medium-size companies that concentrate on civilian ADP contracting. Large companies previously content with equally large defense contracts are going after relatively small civilian contracts that they used to spurn. This is causing difficulties for smaller firms that can't readily muster the resources needed to compete with larger contenders. While a large firm can afford to absorb a lower margin at the start of an ADP goods or services contract in the hopes of making it up in the out years, it can be dangerous for a small company to live so close to the edge.

In addition to government customers, government ADP contractors are also trying to shift to commercial customers and to increase exports to foreign markets. Both of these moves can provide a measure of stability and replace lost DOD dollars. Still, this is easier said than done for the many systems integrators, manufacturers, software consulting firms and service companies addicted to DOD money.

The go-go days of the 1980s are over. With the DOD market for ADP scaling down, the winners will be those companies flexible enough to get the move to civilian contracting well under way before the ax truly falls.

Mohr is a partner at the law firm of Cohen & White in Washington, D.C.

State enacts piracy law

BY PATRICIA KEEFE
CW STAFF

Massachusetts recently enacted the nation's first executive order mandating that state agencies uphold software licensing agreements.

"We feel it is incumbent upon the Commonwealth to establish as law — and to set as an example — the protection of the creative software work of . . . software professionals," Gov. Michael S. Dukakis said last month. He issued the order at the request of the Massachusetts Computer Software Council.

The law prohibits state employees from pirating or illegally copying software programs. It not only requires agencies that use either stand-alone or networked personal computers to hold a license for all software used, but it also makes agency managers responsible for its enforcement.

Spokesmen for the Software Publishers Association and Adapso praised the initiative.

NICKELS & DIMES

Control Data Corp. reported a loss of $196.4 million on revenue of $523.7 million for its fourth quarter of 1989, ended Dec. 31. In the corresponding quarter of 1988, CDC reported a net loss of $12.8 million on revenue of $933 million.

Fourth-quarter earnings included a $214.7 million portion of the $663.3 million restructuring charge absorbed by CDC in 1989.

For its fourth quarter ended Dec. 29, 1989, **Storage Technology Corp.** reported net income of $22.3 million, compared with a $20 million profit in last year's corresponding quarter. Fourth-quarter revenue totaled $299.8 million, an 11% increase over last year's fourth-quarter sales.

Hogan Systems, Inc. reported net income of $1.9 million on revenue of $11.8 million for its third fiscal quarter, ended Dec. 31. For the quarter ended Dec. 31, 1988, the company reported net income of $2.1 million on revenue of $11.1 million.

For the fourth quarter of 1989, **Nynex Corp.** reported a net loss of $43.7 million, compared with net income of $342.2 million in the fourth quarter of 1988. Total operating revenue for the quarter was $3.4 billion, compared with $3.2 billion in the same quarter last year.

Chips and Technologies, Inc. reported net sales of $74.4 million and net income of $8.9 million for the second fiscal quarter ended Dec. 31, 1989. This compares with net sales of $54.4 million and net income of $7.9 million for the second fiscal quarter ended Dec. 31, 1988.

Bolt Beranek and Newman, Inc. reported sales of $63.6 million for its second quarter ended Dec. 31, 1989, compared with $75.4 million in the second quarter last year. The company had a net loss of $3.1 million, compared with a loss of $5.9 million during the same period a year earlier.

Concurrent Computer Corp., which previously announced it would take a one-time charge of $3 million for restructuring costs, reported a quarterly net loss of $2.2 million for its second quarter ended Dec. 31. The results compared with a net loss of $14.8 million in the second quarter of the prior year. The firm earned revenue of $89 million compared with $90.7 million in the previous year's second quarter.

Knowledgeware, Inc. reported net income for the quarter ended Dec. 31 of $1.7 million — an increase from its net income of $1.1 million during the same period a year ago. Revenue for the quarter was $14.3 million, up 131% from revenue of $6.2 million for the corresponding period in 1988.

SEEQ Technology, Inc. announced that revenue for the first fiscal quarter ended Dec. 31, 1989 was $12.3 million, with a net loss of $1.1 million. This compares with revenue of $14.5 million and net income of $1.1 million for the same quarter of the prior fiscal year.

Northern Telecom, Inc. reported a $163 million profit, or a 45% increase in 1989 fourth-quarter earnings over the results of the 1988 fourth quarter. The company also reported fourth-quarter revenue of $1.79 billion, a 17% increase over sales in last year's comparable quarter.

QMS, Inc. reported that quarterly sales for the three months ended Dec. 29, 1989 totaled $62.8 million, an increase of $14 million, or 29%, over $48.7 million in sales reported in the first quarter of fiscal year 1989. Net income increased to $3.35 million, compared with $1.32 million for the same period one year earlier. The previous year's results included $558,000 in extraordinary income resulting from utilization of a portion of an acquired company's net operating loss carryforwards.

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EXECUTIVE CORNER

Alantec grabs TRW net founder

Networking veteran **J. Edward Snyder III**, who founded and served as general manager of the TRW Networks Division, is the new president and chief executive officer at Fremont, Calif.-based LAN products vendor **Alantec**. Snyder, 44, replaces Alantec co-founder **Michael Kalashian**, who will remain as the company's chairman and executive vice-president.

Meanwhile, former **TRW Financial Systems, Inc.** President and General Manager **Charles H. Shorter**'s move into the office of vice-president and assistant general manager for technology and new business at **TRW Information Systems** saw his prior post pass to 20-year financial services industry veteran **John Reese**.

NEC Technologies, Inc. announced last week that **Hisao Kanai**, an executive vice-president of Japanese parent corporation **NEC Corp.**, is the new chairman and chief executive officer of the Boxboro, Mass.-based computer and electronics company.

Kanai's appointment, which is effective immediately, complements the company's acceptance of current Chairman **Richard M. Underwood**'s planned request to retire.

C. Itoh Electronics, Inc., a wholly owned subsidiary of Japanese electronics giant C. Itoh & Co., Ltd. that is based in Irvine, Calif., has named longtime company executive **S. Homma** as its new president.

Homma, who among other tasks will be exploring new business opportunities for the terminal, printer and storage peripherals supplier, replaces **K. Sudo**, who has accepted a new management position at the parent company's international headquarters in Tokyo.

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IN BRIEF

A loan at last

A federal bankruptcy court in Colorado last week issued a final order allowing **Miniscribe Corp.** to borrow $15 million from its lending bank. According to Miniscribe President Richard Rifenburgh, the loan will make it possible for the company to carry on its business while it looks for a buyer under the aegis of investment banker Merrill Lynch Capital Markets.

. . . .

Back in the saddle

With the unsolicited attention of DPC Acquisition Corp. and a consequent 25 months of corporate and financial upheaval finally in the past, **Dataproducts Corp.** is back to taking care of business. Late last month, the company announced the sale and leaseback of its Woodland Hills, Calif., headquarters and manufacturing plant, a move that netted the company approximately $40 million to distribute to shareholders; a cash tender offer for as much as an estimated 20% of its own shares; and a small third-quarter pretax profit.

. . . .

Encore!

After a two-quarter stay on the bleak side of the ledger, **Encore Computer Corp.** is back in the black. The Fort Lauderdale, Fla.-based company's fourth-quarter profit of $134,000 on $8.9 million of revenue shows that Encore has successfully digested its April 1989 acquisition of **Gould, Inc.**'s computer systems business, Chairman and Chief Executive Officer Kenneth G. Fisher said.

. . . .

One more irony

New **Prime Computer, Inc.** President Jack Shields may find himself getting ribbed as well as congratulated this week. Last year, Prime fought tooth and nail against a junk bond-financed takeover by **MAI Basic Four, Inc.** Last week, Moody's Investors Service, Inc. reportedly slapped a CAA — i.e., junk bond — rating on some $300 million of debt issued by the subsidiary of Prime-approved acquisitor **J. H. Whitney & Co.** that was formed to buy Prime.

. . . .

There, that's settled

Chalk one up for **Novell, Inc.** in what the systems software vendor's general counsel termed "the extensive effort being waged worldwide by Novell to eliminate copyright infringement." Under terms of a settlement with once-authorized reseller **CPT of South Florida, Inc.**, accused of making and selling unauthorized copies of Novell's Netware, Novell will receive a "substantial" undisclosed sum.

Buyer alert: Home costs take a bite from CIO pay

If the results of *Computerworld*'s 1989 salary survey had you thinking about packing up the family and traveling to greener pastures, you may want to think again. The hefty salaries typical of other parts of the country may not look so inviting when you add up the cost of living there.

In areas where pay tends to be high, housing costs often take a disproportionately large dent out of incomes, according to an analysis of the survey results.

The accompanying map and table illustrate the relationship between income and housing costs. They relate the average compensation of chief information officers and information systems vice-presidents with median prices of new homes in the 13 areas covered in *Computerworld* 's survey.

The table and chart show that the relatively healthy compensation pulled down in areas such as New York, Boston and Northern and Southern California fall short of making up for the lofty housing prices in those regions. The areas with the most favorable ratios of income to housing costs tend to be Sun Belt cities with moderate compensation and low-to-moderate housing costs, along with Detroit, where the pay is fairly low but housing costs are rock bottom.

Thus, one reason why the pay is so good in the big coastal cities is that finding a place to live there can be an expensive proposition. Housing costs, in turn, depend on many factors, including the strength of the local economy, population density and tax structure.

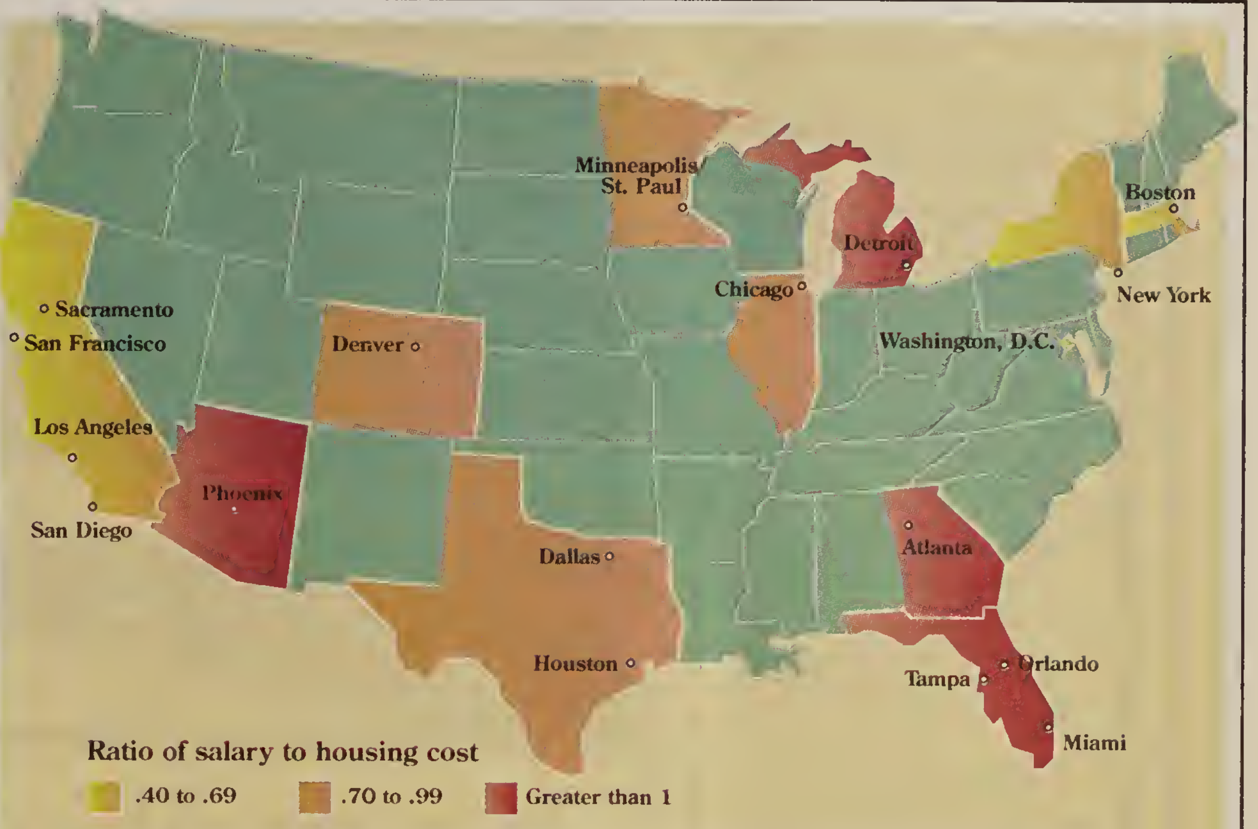
Income factor

The relationships between income and housing costs may help explain responses to the survey about satisfaction with compensation levels.

Respondents from areas with lower levels of compensation ranked higher in average level of satisfaction than their colleagues with higher compensation levels. The ones in Atlanta, for example, weighed in with the second highest level of satisfaction but the sixth highest compensation. When compared with local housing costs, however, their income ranks second highest.

After hunting for a home, the fat checks in the big city could start looking pretty small; depending on where you live now, they may not even cover your current standard of living.

As it clearly demonstrates, a great deal may not be such a good thing once you pull the green wrapping off it.



Go south, young manager

Southern cities boast the highest average CIO compensation in proportion to median housing prices

	CIO salary	Housing cost	Ratio (S/C)
Phoenix	$91,306	$76,800	1.19
Atlanta	$92,183	$85,600	1.08
Miami/Orlando/Tampa	$86,029	$79,678*	1.08
Detroit	$81,225	$76,200	1.07
Dallas/Houston	$81,377	$84,228*	.97
Minneapolis/St. Paul	$81,536	$87,800	.93
Denver	$77,554	$88,500	.88
Chicago	$93,657	$111,400	.84
New York	$114,429	$183,600	.62
Boston	$110,283	$183,300	.60
Washington, D.C.	$86,226	$145,300	.59
Sacramento/San Francisco	$99,075	$200,595*	.49
L.A./San Diego/Anaheim-Santa Ana	$99,285	$220,449*	.45

*Weighted for population of multiple metropolitan areas

SALARY INFORMATION FROM A CW SURVEY, SEPT 4, 1989
HOUSING COST INFORMATION FROM NATIONAL ASSOCIATION OF REALTORS, 3RD QUARTER 1989 FIGURES
POPULATIONS FOR WEIGHTING FROM PLACES RATED ALMANAC BASED ON WOODS AND POOLE ECONOMICS, INC. FORECASTS

CW CHART: TOM MONAHAN

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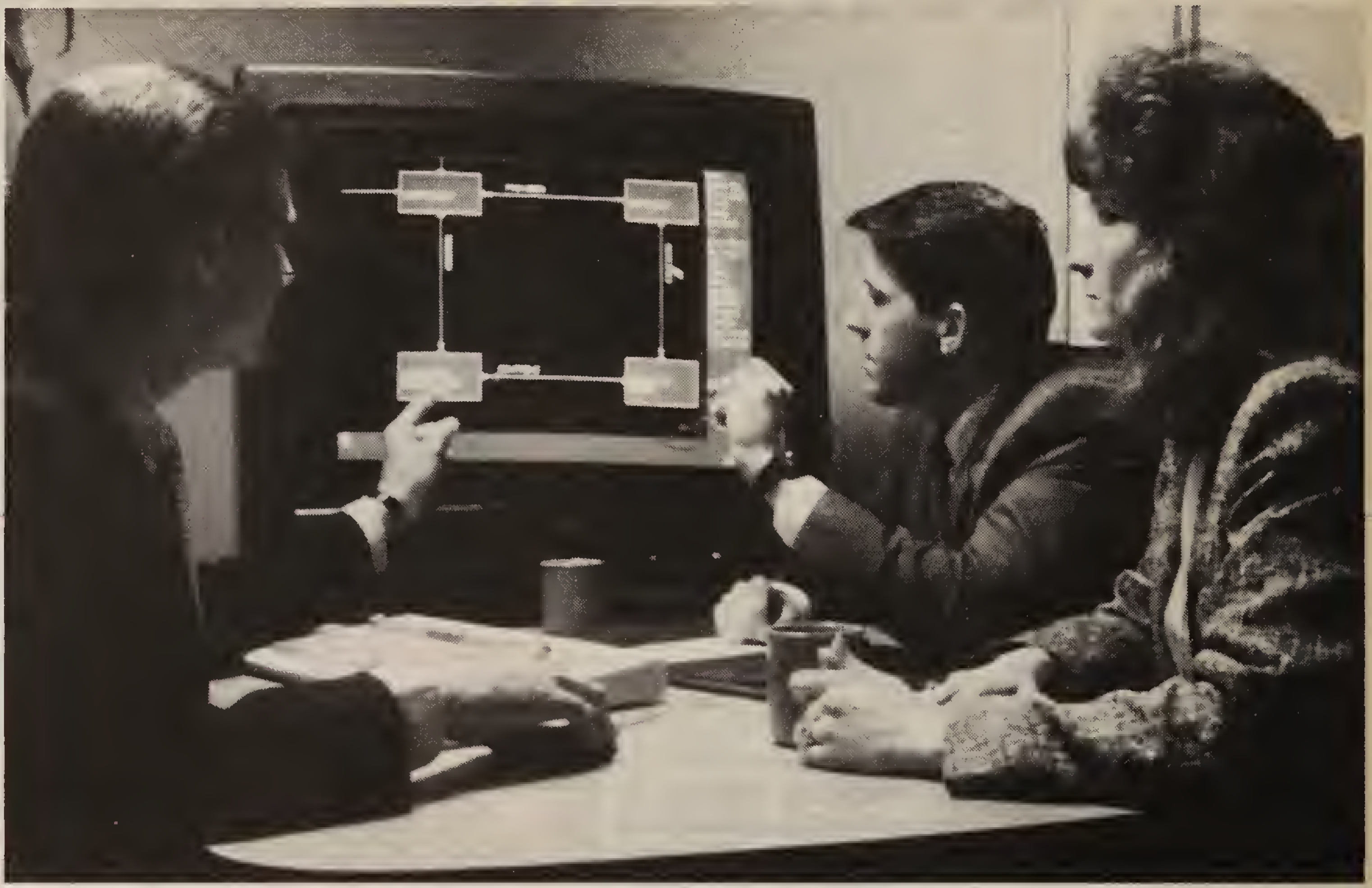

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WASHINGTON, D.C.: 8304 Professional Hill Drive, Fairfax, VA 22031 (703) 573-4115

CHICAGO: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018 (312) 827-4433

LOS ANGELES: 18004 Sky Park Circle, Suite 100,
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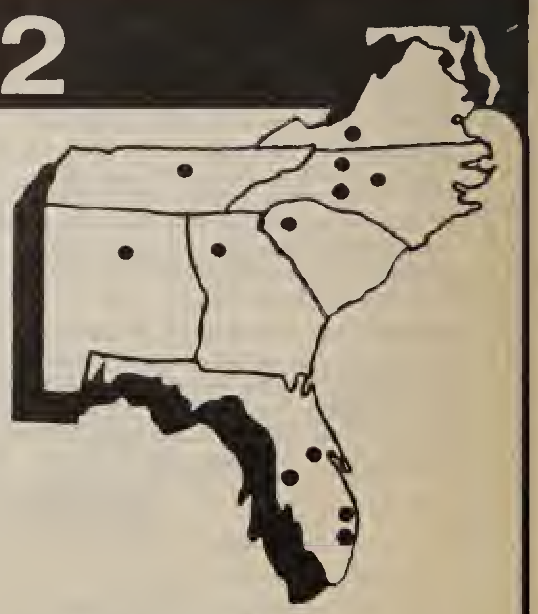

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To find out more about career opportunities within your desired location, **please CALL (305) 772-6662 or RUSH your resume to: Danny Taylor, Staffing Coordinator, COMPUTER TASK GROUP, 6499 NW 9th Ave., Suite 205, Ft. Lauderdale, FL 33309.** *Equal Opportunity Employer*

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All the information you need is right here. Just call Lisa McGrath at 800-343-6474 (in MA, 508-879-0700). Or, if you want, you can send us the form below via mail or to our FAX machine. You can reach our FAX at ext. 739 or 740 at either of the above numbers.

The following information will help you determine the size ad you'd like to run and when you'd like to run it.

CLOSING DATES: To reserve space, you need to call us by 5PM (all continental U.S. time zones), 6 days prior to the Monday issue date. We need your ad materials (camera-ready mechanical or copy for pub-set ad) by 5PM, 5 days prior to the weekly issue.

AD COPY: We'll typeset your ad at no extra charge. You can give us copy via phone, U.S. mail, or FAX. To typeset an ad for you, we need clean, typewritten copy. Figure about 30 words to the column inch, not including headlines. (There are seven columns on each page.)

LOGOS AND SPECIAL ARTWORK: Any logos or special artwork should be enclosed with your ad copy. For best reproduction, please send us either a stat of your logo or a clean sample on white bond paper.

COLUMN WIDTHS AND MINIMUM DEPTHS: Your ad can be one of seven different widths. There is a minimum depth requirement for each width. You can also run larger ads in half-inch increments. The chart below can serve as a reference.

NUMBER OF COLUMNS	WIDTH	MINIMUM DEPTH
1 column	1-1/4"	2"
2 columns	2-5/8"	2"
3 columns	4-1/16"	3"
4 columns	5-9/16"	4"
5 columns	6-15/16"	5"
6 columns	8-3/8"	6"
7 columns	9-3/4"	7"

RATES: Your rate will depend on the size of your ad and whether you choose to run regionally or nationally. The national rate is $14.85 per line or $207.90 per column inch. The regional rate (Eastern, Midwestern or Western editions) is $10.80 per line or $151.20 per column inch. You can run your ad in any two regions for $13.50 per line or $189.00 per column inch. In all cases, you can earn volume discounts.

The minimum ad size is two column inches (1-1/4" wide by 2" deep) and costs $415.80 if run nationally. A sample of this size appears below. You can run larger ads in half-inch increments at $103.95 per half inch. Box numbers are available and cost $25 per insertion ($50 if foreign).

Programmer Analyst

This is a sample ad for Computerworld's Computer Careers section. It will help you decide what size ad you'd like to run. Remember that you can run your ad either regionally or nationally in our recruitment section and that the minimum ad size is one column (1 4/16 inches wide) by two inches deep (like this sample). This ad would cost $415.80 in our national edition, $302.40 in the Eastern, Midwestern, or Western edition, and $378.00 in two regions; volume discounts apply.

SAMPLE AD SIZES AND PRICES: To assist you in planning your recruitment advertising, the following shows common ad sizes and their respective costs.

	One Region (East, Midwest or West)	*Two Regions (East/West East/Midwest, Midwest/West)*	*National Edition*
1 column x 2"	$ 302.40	$ 378.00	$ 415.80
2 column x 2"	$ 604.80	$ 756.00	$ 831.60
3 column x 3"	$1,360.80	$1,701.00	$1,871.10
4 column x 5"	$3,024.00	$3,780.00	$4,158.00
5 column x 7"	$5,292.00	$6,615.00	$7,276.50

PAYMENT: If you're a first-time advertiser or if you haven't established an account with us, we need your payment in advance (or with your ad) or a purchase order number. Once you have established an account with us, we'll bill you for any ads you run as long as your payment record is good.

COMPUTER CAREERS NETWORK BUYS: You can take advantage of special rates that let you run your ad in *Computerworld* and *Computerworld*'s sister newspapers at special rates. Choose from *Computerworld Focus on Integration, Network World, InfoWorld, Digital News and Federal Computer Week. Call for details.*

Computerworld Recruitment Advertising Order Form

Ad Size:______ columns wide by ______ inches deep

Issue Date(s): ____________________

Name: ____________________

Company: ____________________

Address: ____________________

Telephone: ____________________

Region: ☐ East ☐ Midwest ☐ West **National:** ☐
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800-343-6474 (In MA, 508-879-0700)
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S/38 AS/400 Prog/Anal's (RPG III)	29 36K
TANDEM Prog/Anal's	30 38K
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DB2 SQL Prog/Anal's	30 40K
MSA or M&D Sys Anal's	35 45K
Bank Prog/Anal's or Sys Anal's	30 45K
Mfg Sys Anal's	35 43K
Retail Prog/Anal's	30 35K
Insurance Prog/Anal's	30 35K
ASSEMBLER Programmers (IBM)	29 34K
ADABAS/NATURAL Prog/Anal's	30 36K
ORACLE SQL Prog/Anal's	29 39K
VAX Prog/Anal's, Soft Engr's	32 40K
FOCUS Prog/Anal's	29 35K
IDMS ADS/O Prog/Anal's	29 35K
IMS DB/DC Prog/Anal's	29 36K
PL/1 Prog/Anal's (VM or MVS)	30 36K
Accounting Sys Anal's	35 49K
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Lead System Software Engineer. By March 6, 1990 send resume to: Employment Security Department, ES Division, ATT: JOB# 0182780-H, Olympia, Washington 98504. JOB DESCRIPTION: Lead System Software Engineer, Data Access Business Unit. Designs, implements, and tests complex and high level systems and software for mini and micro computers. Assumes lead responsibility to design relational database engine for multi-user, multitasking environment utilizing OS/2 and XENIX operating systems and "C" and 86 Assembler Series languages. Will work with 386-based microcomputers. Assumes major project responsibility including: 1) requirements and analysis of project specifications; 2) product design; and 3) implementation schedules. REQUIREMENTS: M.A. or M.S. in Mathematics, Computer Science, Electrical Engineering or Physics. Computer software design or programming: two years' work experience designing and implementing relational data base systems for multi-process environment. This must include six months' work experience in computer design or programming, utilizing MS-DOS and XENIX or UNIX operating systems, "C" and 86 Assembler Series languages and 286- or 386-based microcomputers. 20 course hours in data base design and distributed processing. Must have proof of legal authority to work in the United States. SALARY: $40,500-$41,500 per annum depending upon experience. 40 hours per week, flex time. Position located in Redmond, Washington. EOE

Computer Systems Engineer for Systems Analysis and Software development for various business applications. Handles coding, testing and modification of existing software systems using REALIA COBOL/CICS for personal computers. Handles upload and mainframe for production; testing, documentation, software maintenance, user interface, and provides technical assistance. Must have B.S. in Mathematics + 2 yrs. experience in job offered. Hrs. 8:00 - 5:00 P.M. Monday - Friday. Salary: $3,041.66/Mo. Please send resumes to: Division of Employment Security, 421 East Dunklin Street, Jefferson City, MO 65101. ATTN: John F. Scott, Reference J.O. #336276.

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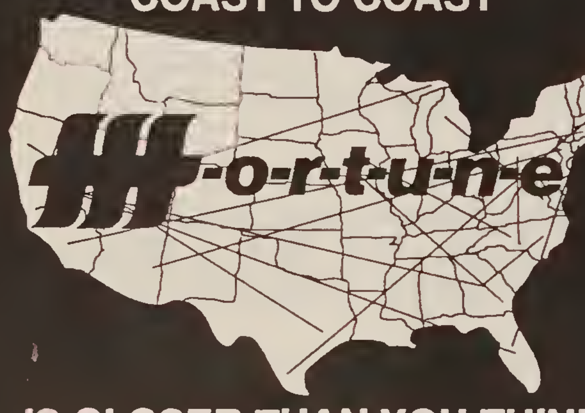

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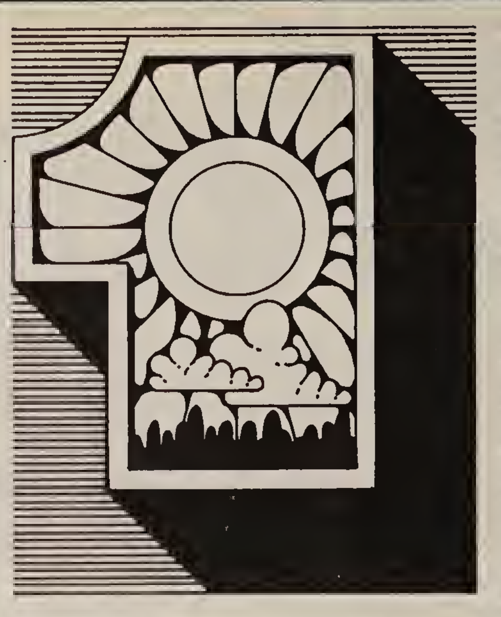

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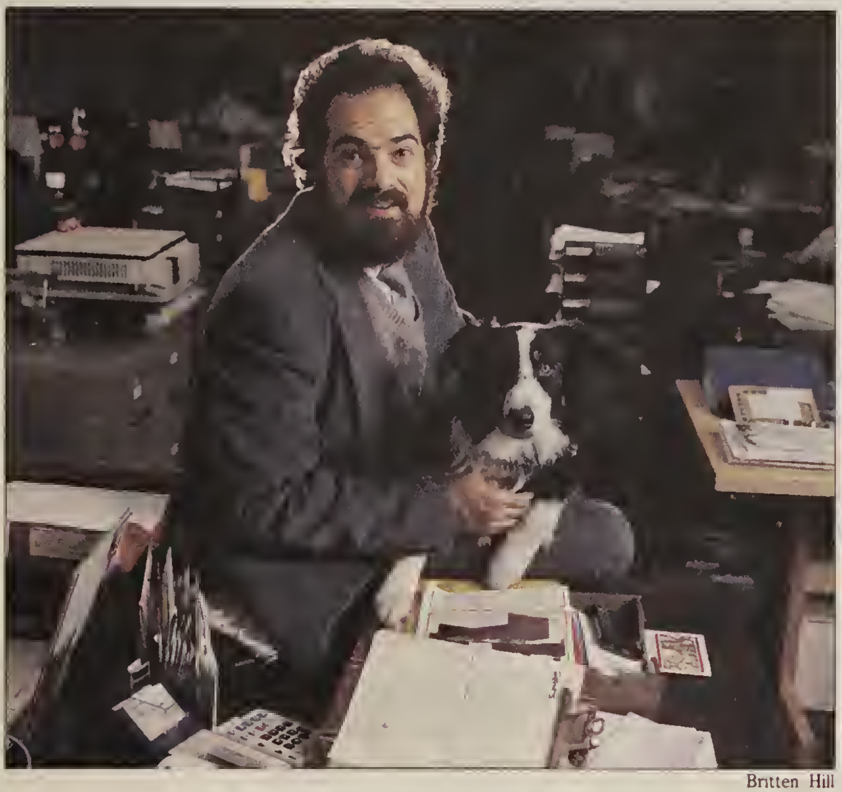
MARKETPLACE

The bargain-hunter's market

At the Boston Computer Exchange, Macintosh rides a compatibility wave

Alex Randall keeps his finger on the pulse of the personal computer market as co-founder and president of the Boston Computer Exchange, which brings together buyers and sellers of used PCs. Randall recently took time out from chores such as finding a buyer for Walter Cronkite's PC and arranging for a machine to be donated to a school in Haiti to talk with Computerworld *Senior Writer David Ludlum.*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BoCoEx's Randall *and faithful friend track used PC market*

Do used computer prices follow a regular pattern?
There's a long, gradual decline. There are a lot of variables that go into it. Sometimes, that slow descent is punctuated with moments of frenzied activity that drive the prices up and down. But the trend is gradually downhill, down to something we refer to as base value.

The rule of thumb is that the base value ends up about the price the manufacturer paid for the components. Your standard IBM PC that hit the marketplace in 1981 at around $5,000 has been trading for a long time in the $500 to $600 range.

What causes the frenzy?
Succeeding models. If you've got a Mac 128 and Apple introduces a 512, the day the 512 is introduced, the 128 takes a price hit. Then you introduce a Macintosh Plus, and the 128 takes another hit. The one that's two models back gets shaken the most.

Do those declines vary?
The exceptions to general principle are fascinating. The secondary market is a dog detector. The predecessor models will hold their value if the replacement product is a mistake.

What's going on now?
The most interesting thing I've watched recently was the introduction of many superlight laptops at Comdex. The Compaq LTE is the outstanding example. They all beat the bejesus out of the Compaq Portable III. It's a case of a successor model with enhanced features.

Have you observed any major shifts in the market?
We used to do about one-third Macintosh and two-thirds IBM and IBM-type computers, and it's moving closer to 50/50. I attribute this to all the stuff that makes Macintoshes good. There are more of them around. They're legitimized in the market. It's apparent that if you're doing standard desktop publishing, you're smarter working with a Macintosh than an IBM assemblage of components.

Has IBM made mistakes?
IBM shot itself in the foot. IBM made it inconvenient to connect IBMs together. The differences between the AT bus and the PS/2 bus make the whole thing look like a Greyhound station — there are too many buses.

I'm experiencing a certain level of agony myself. I've got my entire operation running on ATs and XTs. All of the network cards — I probably have 50 — plug into this generation of computers. For me to replace all the computers with PS/2s means replacing all the network hardware at the same time.

So you don't want PS/2s?
Yeah, but look at the capital expenditure. At the same time, I've got people who are bellyaching about how hard it is to do desktop publishing, even with the PS/2. There's a crowd of people saying if we're going to have to make a conversion, the other choice is to get Macintoshes. And look how easy it is and look how consistent it's been from Mac 128s to IICXes. You can run Macdraw and Macpaint from the 128 era on the IICXes.

What do you make of the market for new PCs?
I think the marketplace is in a slump now because there's a lot of indecision about whether the state-of-the-art machines are really all that much better.

This came home to me when I was on the phone with a client who was buying a 16-MHz 386 with a 130M-byte hard disk and 6M bytes of RAM. And he was going to use Wordstar to write memos. I said, "Why are you buying all this horsepower?" He said, "Well, my friend said this is the best, and I like to have the best stuff." He bought a space shuttle to go to the drug store.

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The BoCoEx index on used computers

Closing prices report for the week ending January 26, 1990

	Closing price	Recent high	Recent low
IBM PC Model 176	$550	$825	$400
XT Model 086	$700	$825	$700
XT Model 089	$850	900	$700
AT Model 099	$1,450	$1,600	$1,300
AT Model 239	$1,825	$1,850	$1,700
AT Model 339	$1,825	$1,850	$1,700
PS/2 Model 50	$1,800	$1,900	$1,500
PS/2 Model 60	$2,425	$2,700	$2,425
Compaq Portable I	$650	$700	$550
Portable II	$1,700	$1,725	$1,550
Portable III	$2,350	$2,500	$2,000
Portable 286	$1,900	$2,000	$1,600
Plus	$750	$950	$675
Deskpro 286	$1,525	$2,025	$1,300
Deskpro 386	$2,475	$2,750	$2,475
Apple Macintosh 512	$575	$650	$525
512E	$650	$890	$625
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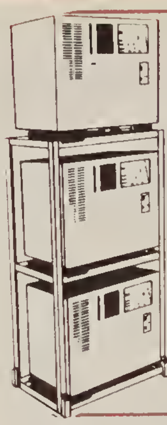

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Request for Proposal No. 1694, due Tuesday, February 20, 1990 at 3:30 p.m. for the acquisition of a 20-workstation local area network for HINDS COMMUNITY COLLEGE, Utica campus.

Request for Proposal No. 1724, due Monday, February 19. 1990 at 3:30 p.m. for the acquisition of a maintenance contract on an existing minicomputer and various peripherals for NORTHWEST MISSISSIPPI COMMUNITY COLLEGE.

General Request for Proposal No. 1725, due Monday, March 5, 1990 at 3:30 p.m. This is a general RFP to be used through January 1991 for the acquisition of microcomputer-based systems, peripherals and software for the STATE OF MISSISSIPPI.

Request for Proposal No. 1728, due Thursday, March 1, 1990 at 3:30 p.m. for the acquisition of Career Information Delivery System software for the DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT.

Request for Proposal No. 1732, due Monday, February 26, 1990 at 3:30 p.m. for the acquisition of a small local area network for the MISSISSIPPI TREASURY DEPARTMENT.

Request for Proposal No. 1733, due Thursday, March 1, 1990 at 3:30 p.m. for the acquisition of two pharmacy management software systems and an upgrade of a Condor RX-80 pharmacy system for ELLISVILLE STATE SCHOOL, SOUTH MISSISSIPPI RETARDATION CENTER and EAST MISSISSIPPI STATE HOSPITAL.

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Showing users the ways of IS

Educating them about application development can help avoid conflicts

BY MARK DUNCAN
SPECIAL TO CW

Users are critical participants in application development. However, training for development is generally perceived as the prerogative of systems professionals. This is not fair. Application developers have certain expectations of users, and users have certain ones of developers. What better way of conveying those expectations than by appropriate training?

The information systems staff should not be the only audience for system development training. The following important elements should be considered part of the training program for users.

Glossary of terms. This is a list of deliverable names, development activities, acronyms and any other terminology or jargon that is second nature to a developer but that may mean little or nothing to a user.

Care must be taken to keep the glossary up to date. Such is the nature of IS that new terms are always being introduced to accommodate changes in technology and processes. An out-of-date or inaccurate glossary will hinder rather than facilitate communication.

The overall system life cycle. Historically, users have been shielded from the nuts and bolts of the development life cycle. Their involvement came at specific and isolated points, and they have been left with only a vague idea of what had gone before and what was yet to come.

It would be far better for a user to know what the entire life cycle looks like. New technology and new methods have made greater awareness of system development almost a necessity for users. Prototyping tools, joint application design techniques and sophisticated testing tools have all contributed to greater user involvement.

The cost of quality. Most modern user departments face rising maintenance costs and lengthening application backlogs. The primary cause of these two conditions is the poor quality of aging software. The result is that maintenance consumes resources that may otherwise be deployed in new development.

However, much more is known today about quality in application software as well as how to achieve and sustain it, and this information must be shared with the users.

Users must be taught the components of the cost of quality — error prevention, error detection and error correction costs. They must be indoctrinated with the philosophy that it is better to construct software correctly the first time than to have to do it over again. Quality assurance practitioners warmly espouse this maxim: "The bitterness of poor quality is remembered long after the sweetness of meeting a deadline has been forgotten."

It has been shown that perfecting analysis and design has salutary effects on both productivity and quality. Users must be apprised of these important issues.

Project cost estimation. Every user probably has been surprised at one time or another by a cost estimate for developing or modifying an application. In fact, users are often downright perplexed about how a small system or trivial change could cost so much.

Once again, understanding can come through knowledge about exactly what it is that costs money — the deliverables, the methods, the human resources. Users need to know what takes place in the various development phases, who is involved, for how long and what is produced. With maintenance, users may be unaware of the impact a small change can have on neighboring applications.

As users become more computer literate and acquire greater savvy about system development, there is no reason why they can't help estimate costs. The effect will be to negate any surprises. Greater awareness will also help when additional costs arise due to the unexpected, such as staff turnover, limited computer availability, sudden changes in project priority, changes in requirements or unforeseen hardware upgrades.

The ultimate scenario, of course, is one in which estimating packages will help users prepare their own estimates in the first instance and then leave it up to IS to justify a different one.

The consequences of change. It is true that modern development tools and methodologies can accommodate change easier than in the past. Users, however, must still be encouraged toward sound and thorough design on the first pass. Statistics on the costs of change can send a clear message. For example, while it may cost $100 to correct an error detected in the requirements phase, the same error can cost several thousand dollars to correct in production.

There are other fundamental topics that should be part of system development training for users: the importance of standards, the interaction of various IS units, technology awareness and others.

The objective behind the training is to enable the user to become a more legitimate and effective contributor to system development — a bona fide member of the project team.

Duncan is a quality assurance consultant at a large Dallas bank.

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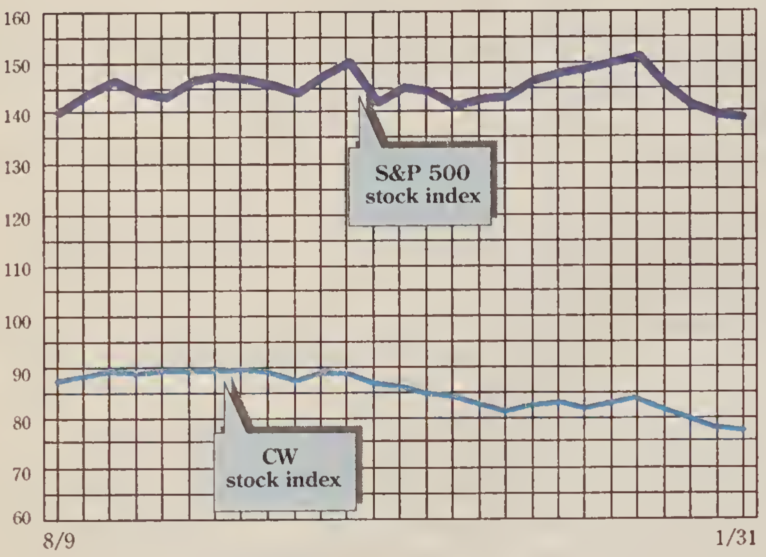

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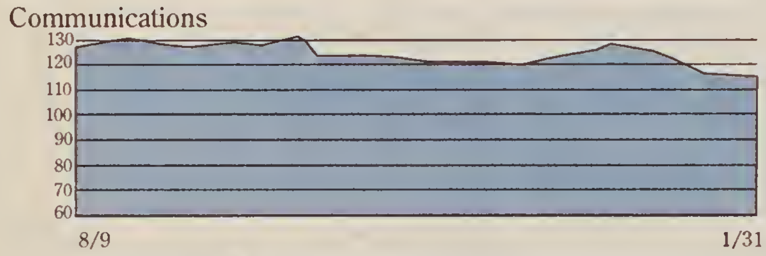
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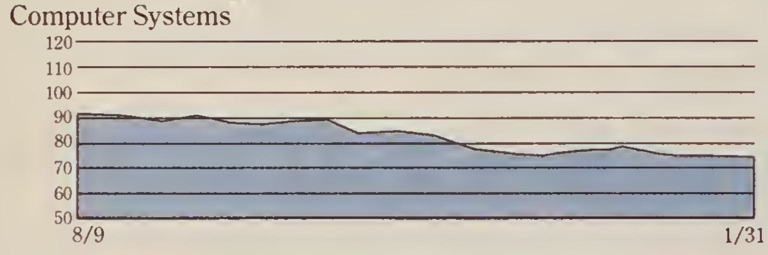
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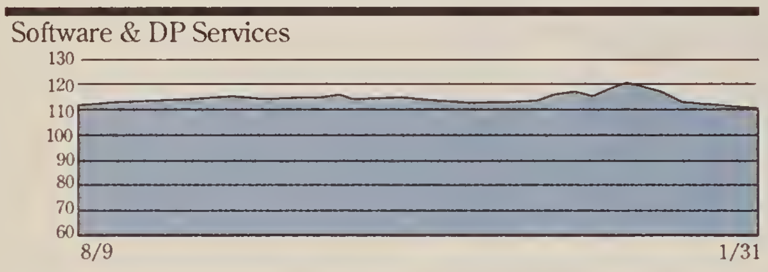
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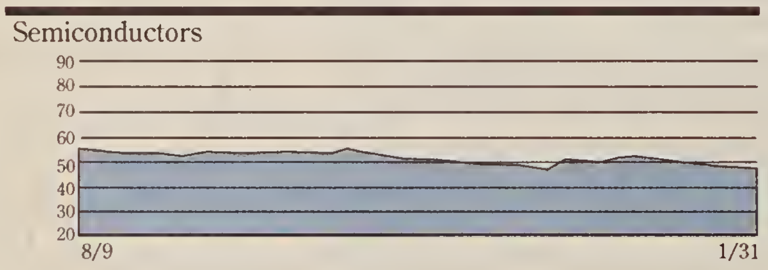
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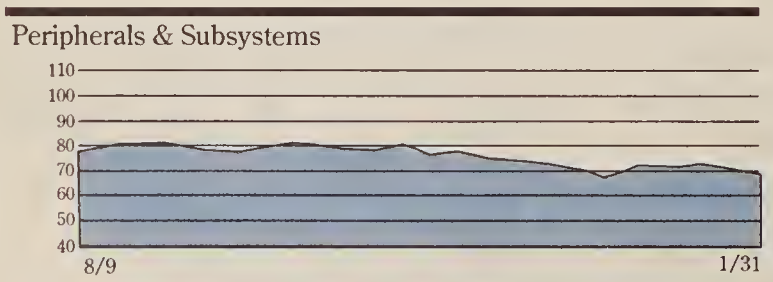
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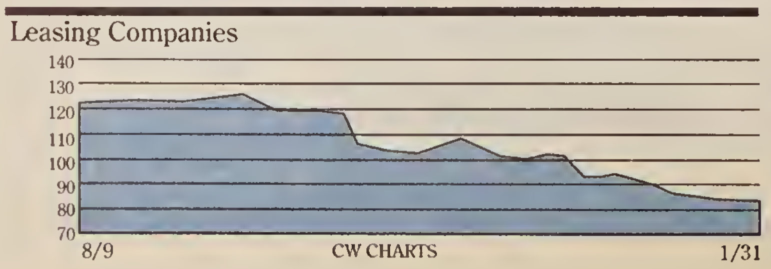
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Q	AVANTEK INC	7	3	3	-0.4	-12.7
N	AYOIN CORP	21	14	14.25	-1.0	-6.6
N	BELL ATLANTIC CORP	114	72	97.75	2.8	2.9
N	BELLSOUTH CORP	59	40	52.375	1.0	1.9
Q	COMPRESSION LABS INC	13	3	9.875	-0.6	-6.0
Q	CONTEL CORP	37	22	27.875	1.8	6.7
Q	DATA SWITCH CORP	6	2	2.875	0.3	9.5
Q	DIGITAL COMM ASSOC	25	17	20.125	-0.1	-0.6
Q	DYNATECH CORP	21	16	16.5	0.0	0.0
Q	FI8RONICS INTNL INC	7	4	5.875	-0.1	-2.1
Q	GANDALF TECHNOLOGIES	7	4	3.625	-0.3	-6.5
N	GENERAL DATACOMM INOS	7	4	4.625	0.0	0.0
N	GTE CORP	72	44	62.875	0.0	0.0
Q	INFOTRON SYS CORP	13	6	7	0.0	0.0
N	ITT CORP	65	51	54	0.1	0.2
N	M A COM INC	9	4	4.125	0.0	0.0
Q	MCI COMMUNICATIONS CORP	49	24	32.5	-6.3	-16.1
N	NETWORK EQUIP TECH INC	32	19	28.5	0.1	0.4
Q	NETWORK SYS CORP	10	7	8.25	-0.1	-1.5
N	NORTHERN TELECOM LTD	25	14	23.375	-0.4	-1.6
Q	NOVELL INC	38	24	30	0.8	2.6
N	NYNEX CORP	92	67	81.5	-1.0	-1.2
N	PACIFIC TELESIS GROUP	52	32	45.75	-0.3	-0.5
A	PENRIL CORP	9	4	6	-0.4	-5.9
N	SCIENTIFIC ATLANTA INC	25	14	22.25	0.8	3.5
N	SOUTHWESTERN BELL CORP	65	42	52.875	-2.3	-4.1
Q	3 COM CORP	29	10	11	-0.5	-4.3
N	U S WEST INC	81	59	69.125	-0.4	-0.5

Computer Systems

Q	ALLIANT COMPUTER SYS	7	3	6.375	0.3	4.1
Q	ALPHA MICROSYSTEMS	8	4	4.125	-0.3	-5.7
Q	ALTOS COMPUTER SYS	8	5	5.25	-0.1	-2.3
A	AMDAHL CORP	23	11	15.75	1.0	6.8
Q	APPLE COMPUTER INC	50	32	34	0.0	0.0
N	8OLT BERANEK & NEWMAN	11	5	5	-1.0	-16.7
N	COMPAQ COMPUTER CORP	113	65	75.75	-6.3	-7.6
N	COMMOOORE INTNL	20	7	8.375	-0.1	-1.5
Q	COMPUTER AUTOMATION INC	6	2	2.75	0.1	4.8
N	CONTROL DATA CORP	24	16	17	0.0	0.0
N	CRAY RESH INC	63	31	44.125	1.4	3.2
Q	DAISY SYS CORP	7	0	0.75	0.1	9.0
N	DATA GEN CORP	20	9	9.625	0.1	1.3
N	OATAPOINT CORP	6	3	3.75	0.0	0.0
Q	DELL COMPUTER CORP	10	5	4.625	-0.3	-5.1
N	DIGITAL EQUIP CORP	122	75	79.125	-0.6	-0.8
N	FLOATING POINT SYS INC	4	1	1.625	0.0	0.0
N	HARRIS CORP	40	27	27.875	-3.0	-9.7
N	HEWLETT PACKARO CO	62	40	44.625	-0.1	-0.3
N	HONEYWELL INC	92	62	81.25	-2.9	-3.4
N	I8M	131	93	98.625	1.1	1.2
Q	INFORMATION INTL INC	16	12	12.5	-0.4	-2.9
Q	IPL SYS INC	9	5	6.5	-0.5	-7.1
N	MAI 8ASIC FOUR INC	11	2	2.75	-0.9	-24.1
N	MATSUSHITA ELEC INOL LTD	186	154	159.25	3.3	2.1
Q	MENTOR GRAPHICS CORP	22	14	15.625	-2.9	-15.5
N	N8I INC	3	0	0.375	0.0	9.0
N	NCR CORP	68	53	67.25	2.4	3.7
Q	PYRAMID TECHNOLOGY	25	9	21	-3.3	-13.4
Q	SEQUENT COMP SYS INC	23	10	19.25	-2.0	-9.4
Q	SHARE8ASE CORP	4	0	0.563	0.2	50.1
Q	SILICON GRAPHICS CORP	30	14	29	-0.5	-1.7
Q	SUN MICROSYSTEM INC	23	13	19.375	2.0	11.5
Q	SYMBOLICS INC	3	1	0.75	-0.1	-7.7
N	TANDEM COMPUTERS INC	28	15	28	2.9	11.4
N	TANDY CORP	49	35	35.375	-1.4	-3.7
N	ULTIMATE CORP	12	7	7.875	0.5	6.8
N	UNISYS CORP	31	12	13.625	-0.5	-3.5
A	WANG LA8S INC	11	4	4.125	0.1	3.1

Software & DP Services

Q	AMERICAN MGMT SYS INC	18	11	11.375	0.4	3.4
Q	AMERICAN SOFTWARE INC	23	11	18.375	-2.3	-10.9
N	ANACOMP INC	8	3	4	1.0	33.3
Q	ANALYSTS INTL CORP	20	11	16.25	0.6	4.0
Q	ASHTON TATE	24	9	10	-0.8	-7.0
Q	ASK COMPUTER SYS INC	18	7	8.25	0.3	3.1
N	AUTO DATA PROCESSING	51	36	47	-1.3	-2.6
Q	AUTOOESK INC	44	27	39.5	2.0	5.3
Q	8MC SOFTWARE INC	33	14	29	-0.8	-2.5
N	8USINESSLAND INC	15	7	6.75	-0.4	-5.3
N	COMPUTER ASSOC INTL INC	22	11	11.75	0.3	2.2
Q	COMPUTER HORIZONS CORP	11	7	8.875	0.1	1.4
N	COMPUTER SCIENCES CORP	59	47	47.75	-4.0	-7.7
N	COMPUTER TASK GROUP INC	16	9	9.5	0.1	1.3
Q	COMSHARE INC	42	23	34	-0.5	-1.4
Q	CORPORATE SOFTWARE	16	8	8.5	-0.3	-2.9
N	GENERAL MTRS (CLS E)	58	43	49.25	-1.8	-3.4
Q	HOGAN SYS INC	7	4	4.125	0.3	6.5
Q	INFORMIX CORP	16	8	14.625	-0.3	-1.7
Q	INTELLICORP INC	6	3	4.25	0.1	3.0
Q	LEGENT CORP	32	21	26.25	0.5	1.9
Q	LOTUS OEV CORP	34	19	28.75	0.0	0.0
Q	MICROSOFT CORP	96	46	92.5	1.8	1.9
Q	NATIONAL OATA CORP	35	23	28	-1.0	-3.4
N	ON LINE SOFTWARE INTL INC	11	5	9.75	-1.3	-11.4
Q	ORACLE SYS CORP	26	11	21.5	1.1	5.5
N	PANSOPHIC SYS INC	19	12	15.5	-0.5	-3.1
Q	PHOENIX TECHNOLOGIES INC	19	3	3	-0.5	-14.3
Q	POLICY MGMT SYS CORP	38	22	32	1.3	4.1
Q	PROGRAMMING & SYS INC	22	16	17.5	0.3	1.4
Q	RELATIONAL TECH INC	16	5	7.25	-0.6	-7.9
N	REYNOLDS & REYNOLOS CO	34	19	19.875	0.3	1.3
Q	SAGE SOFTWARE INC	11	7	9.25	1.0	12.1
Q	SEI CORP	20	15	15.25	-1.8	-10.3
Q	SHAREO MEO SYS CORP	19	12	12.875	0.1	1.0
Q	SOFTWARE PUBG CORP	21	10	19	0.5	2.7
A	STERLING SOFTWARE INC	9	5	8.5	-0.1	-1.4
Q	SUNGARO OATA SYS INC	26	13	19.25	-2.0	-9.4
Q	SYSTEMATICS INC	40	30	30	-2.8	-8.4
N	SYSTEM CENTER INC	26	18	21.5	-0.5	-2.3
N	SYS. SOFT INC	23	12	21.25	-0.8	-3.4
Q	WOROSTAR	3	1	0.938	-0.1	-11.8

Semiconductors

N	AOV MICRO OEVICES INC	11	7	7.25	-0.4	-4.9
N	ANALOG DEVICES INC	13	7	7.625	-0.3	-3.2
Q	ANALOGIC CORP	11	8	9.875	0.4	3.9
Q	CHIPS & TECHNOLOGIES INC	26	14	16.5	-1.0	-5.7
Q	INTEL CORP	40	23	39.5	1.5	3.9
Q	MICRON TECHNOLOGY INC	26	7	7.75	-0.4	-4.6
N	MOTOROLA INC	64	40	54.625	-1.1	-2.0
N	NATL SEMICONOUCTOR	9	5	6	-0.1	-2.0
N	TEXAS INSTRS INC	47	28	33.375	0.3	0.8
A	WESTERN OIGITAL CORP	15	6	8.75	-0.6	-6.7

Peripherals

Q	ALLOY COMP	3	1	2.125	0.3	17.2
N	AM INTL INC	6	3	3.5	-0.3	-6.7
Q	AST RESH INC	15	7	12.625	-0.9	-6.5
Q	AUTO TROL TECH CORP	6	3	3.25	-0.3	-7.1
Q	8ANCTEC INC	20	11	15.875	-0.8	-4.5
Q	CIPHER DATA PROOS INC	11	4	6.75	0.0	0.0
A	COGNITRONICS CORP	8	3	4.25	-0.3	-5.6
Q	CONNOR PERIPHERALS	16	7	12.5	-1.3	-9.1
A	DATAPROOUCTS CORP	18	6	6	-0.9	-12.7
A	OATARAM CORP	12	8	9.625	0.0	0.0
N	EASTMAN KOOAK CO	52	37	38.125	-0.5	-1.3
N	E M C CORP MASS	6	3	4.25	0.1	3.0
Q	EMULEX CORP	12	5	5.25	-0.1	-2.3
Q	EVANS & SUTHERLANO	25	15	23.75	0.8	3.3
Q	ICOT CORP	3	1	1.375	0.1	10.0
Q	INTERLEAF INC	10	5	5.75	-0.3	-4.2
Q	IOMEGA CORP	4	2	3.313	0.1	1.9
Q	LEE DATA CORP	4	1	1.75	-0.1	-6.7
Q	MASSTOR SYS CORP	4	2	2	0.1	3.2
Q	MAXTOR CORP	12	7	9.375	0.4	4.2
Q	MICROPOLIS CORP	8	3	3.875	0.0	0.0
Q	MINISCRI8E CORP	7	0	0.406	0.0	8.3
N	MINNESOTA MNG & MFG CO	84	65	78.125	0.1	0.2
Q	PERSONAL COMP PROOUCTS INC	6	4	3.875	0.1	1.6
Q	PRINTRONIX INC	10	7	9.625	-0.1	-1.3
N	QMS INC	14	7	12.625	-0.4	-2.9
Q	QUANTUM CORP	17	4	9.125	-0.5	-5.2
N	RECOGNITION EQUIP INC	13	6	6.25	-0.1	-2.0
Q	REXON INC	8	6	6.25	0.0	0.0
Q	SEAGATE TECHNOLOGY	17	9	16.25	0.5	3.2
N	STORAGE TECH CORP	23	9	16.125	-0.9	-5.1
Q	TANOON CORP	1	0	0.75	0.0	0.0
N	TEKTRONIX INC	24	16	16.625	-0.4	-2.2
Q	TELEVIDEO SYS INC	1	0	0.219	-0.1	-22.1
N	XEROX CORP	69	53	55.5	1.1	2.1

Leasing Companies

Q	AMPLICON INC	15	8	7.875	-1.5	-16.0
N	CAPITAL ASSOC INTNL INC	9	3	3.25	-0.3	-7.1
N	COMDISCO INC	34	21	23.25	0.9	3.9
Q	CONTINENTAL INFO SYS	2	0	0.234	0.0	0.0
Q	LDI CORPORATION	18	12	14.375	0.1	0.9
Q	PHOENIX AMERN INC	5	3	3.125	0.0	0.0

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL

Hang-ups

MCI's fourth-quarter report gives Street wrong numbers

Ernestine was wrong: Sometimes, even telephone companies have to care. Take last week, for instance, when a less-than-stellar fourth-quarter earnings report from MCI Communications Corp. caused investors to hang up on telephone company stocks. A recovery set in later in the week; even so, MCI closed on Thursday at 33½, down 1⅝. AT&T ended down ¾ of a point, at 38⅜.

Compaq Computer Corp.'s revelation of problems with Intel Corp.'s 80486 microprocessors triggered a spate of heavy trading in Intel stock, which dropped a point early in the week. By Thursday, Intel, which dismissed the bugs as trivial, was on its way back up; its stock closed at 39, up ¼ of a point from its Monday start.

Meanwhile, Compaq's own stock dropped — along with analysts' earnings expectations for the personal computer firm's fourth quarter. While down 14% from last year's comparable quarter, however, Compaq's $79 million fourth-quarter profit exceeded the Street's expectations, fueling the firm's stock back upward. Compaq closed at 78⅝, down 1⅛.

Elsewhere in the technology sector, IBM closed at 97¾ and Digital Equipment Corp. at 77 — a gain of ⅞ for each.

NELL MARGOLIS

IBM preps Unix-based RISC line for blast-off

BY AMY CORTESE
CW STAFF

The code name RIOS will give way to the RISC System/6000 in two weeks when IBM unveils its long-awaited Unix-based reduced instruction set computing (RISC) systems.

As part of a strategy to minimize any cannibalization of its proprietary product lines and to grab a foothold in a market where it has been historically weak, IBM will target the new Unix-based RISC systems at the technical market, despite the prevailing view that the systems will appeal most to commercial customers.

After a series of postponements attributed to operating system bugs, the announcement has been slated for the week of Feb. 12. IBM software partners disclosed last week that an internal briefing is scheduled for today through Wednesday, and industry analysts have been briefed and sworn to secrecy.

The new generation of RISC systems will put IBM ahead of RISC leaders like Sun Microsystems, Inc. in price/performance, according to sources familiar with the new product line. As many as nine systems are expected to debut, ranging from a 27 million instructions per second (MIPS) desktop model to a high-end machine at 41 MIPS.

Those numbers alone are impressive, but faster performance may be gained as a result of a processor architecture that is capable of running as many as five instructions at a time.

While propelling IBM to a credible workstation status, the anticipated price/performance levels threaten to overshadow IBM's proprietary midrange platforms, particularly the successful Application System/400. "If IBM had its druthers, it would like to see [the new systems] as an engineering product," said Gig Graham, program director at Stamford, Conn.-based Gartner Group, Inc. "But unhappily for IBM, they will be considered an alternative for midrange systems" such as the AS/400, he said.

The RT, IBM's first stab at the RISC market, fared dismally in that segment, failing to capture more than 2% of the engineering market. IBM is hoping to change that with features and software designed to appeal to the engineering market.

IBM midrange rollouts expected

BY ROBERT MORAN
and ROSEMARY HAMILTON
CW STAFF

IBM plans to strut its proprietary midrange stuff tomorrow, just a week before the industry expects it to release a long-awaited Unix replacement for the RT workstation line.

According to several sources, IBM will introduce low-end models for its midrange, including at least two for the Application System/400 line and three for its ES/9370 line.

One well-placed source said VSE will play a significant role with the low-end 9370 announcement. The two together will offer capabilities such as unattended operations and will be targeted at distributed 370 environments. VSE is widely used in 9370 installations.

An IBM spokesman responsible for AS/400s confirmed that a press briefing will take place on Tuesday but declined to provide details.

The AS/400 models were strongly hinted at last month by Stephen Schwartz, who heads up the AS/400 business for IBM (see story page 25).

The 9370 models, believed to be a System/370 and Personal System/2 hybrid, have been expected for months. Analysts said a prototype of this desktop 9370, which uses the PS/2 Micro Channel Architecture, was unveiled by IBM in mid-1989 and was known as the so-called Silverstone.

Although IBM is launching new models for two distinct midrange lines, this does not reflect a new midrange positioning, sources said. In other words, the AS/400 announcement and the 9370 announcement just happen to fall on the same day.

The AS/400 models are intended to improve the appeal of the low end, which has been considered too expensive an entry point.

IBM will introduce at least two models, to be named the C10 and C20, said Frank Gens, an analyst at Technology Investment Strategies Corp., a division of International Data Corp. in Framingham, Mass. The new models will cost about the same as the current low ends, the B10 and B20. But the C10 will offer 30% to 40% more performance than the B10, and the C20 will pack 15% to 20% more performance than the B20, Gens said.

3090 J

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there is no incentive to do so. The two lines are priced almost exactly the same.

"We have heard no adverse reports on the J," said Jim Cassell, a vice-president at Gartner Group, Inc. in Stamford, Conn. "It seems to be as solid as a rock."

Cassell also said he expects to see far more E model customers moving to Js than S model users this year. Two of the users contacted by *Computerworld* last week had made an E-to-J switch. According to Cassell, E users can achieve up to a 30% performance gain with this upgrade, while S model users would average only a 7% gain.

At Alamo Rent A Car, Inc., a 3090 600J has been chugging away with no problems since late last year. The company, highly dependent on its car reservation system, wanted to move up from its 3090 400E to improve its response time, according to Thomas Loane, vice-president of computers and communications.

Loane put in an order for an S model last fall and was automatically rolled over to the J model. Since installing the system in late November 1988, Loane has seen an improvement in response time on the reservation system to one-tenth of a second. It had run as high as three-tenths of a second to a half second.

The only glitch occurred early on when a pinched wire caused the system to shut down twice. "Other than the pinched wire, there have been zero problems," Loane said.

Loane said he was also impressed with the installation. IBM had said it would take 24 hours, but Loane's crew and the IBM engineers did it in half that time.

Both Blue Cross/Blue Shield and Engelhard Industries, which picked up a 180J in December 1989, reported easy installations as well. The lower end 180J was to have taken at least 18 hours to install, but Engelhard did it in 12, said John Renavitz, manager of planning and operations.

Payne and the other users said there have been no disappointments in the system's performance and increased capacity.

Payne's staff switched the same work load that had been on a 400E to the 600J. On the 400E, the system ran at 85% utilization.

That figure is slightly below 50% on the new J model. "That gives us reserve power," Payne said. "We can grow with this box, but we couldn't have grown much with the 400E."

Big 3

FROM PAGE 1

the years by changing its business practices to take advantage of the timeliness, accuracy and speed of EDI, said Jim Bruneel, associate director of AIAG, who is on loan from Chrysler.

During the last 12 months, the number of production suppliers for those Chrysler assembly plants that moved from paper to EDI leaped from 700 to 1,700. By the end of this year, another 1,800 will be added, making virtually all trading suppliers EDI-capable.

Chrysler's Barile

"It is our intent to eliminate any piece of paper going between us and a supplier and make it purely electronic," said Dennis Barile, manager of telecommunications at Chrysler.

For the suppliers, the improved EDI communications has provided savings in time and long-distance phone calls. But perhaps more importantly, Chrysler Telecommunications Exchange (CTX) has laid the groundwork for them to work more easily with other automobile manufacturers in the future.

All of Detroit's automobile manufacturers have EDI networks and have to some degree adopted EDI standards, said John Martin, managing director of AIAG. Martin is on loan to AIAG from General Motors. However, he said, "Chrysler is the leader in transactions and number of suppliers" using its EDI system.

None of that would matter without the support of the trading partners, whom Chrysler required to move to EDI.

"We told all the assembly plant suppliers they had to be on board with EDI by last July," Barile said.

The conversion from the old system to CTX was relatively painless, said John McMinn at Tri-Con Industries Ltd. in Columbia, Mo., which assembles automobile seats for Chrysler and moved to CTX last month. "The standardized transaction sets are becoming more common across the three automotive companies, which makes it easier for us should we pick up new business," McMinn said.

The assembly and manufacturing processes will not be the only EDI benefactors at Chrysler, though. The company's nonproduction suppliers — those who provide Chrysler with office supplies, for instance — are also being moved to EDI.

The CTX project began in late 1987 when Tandem Computers, Inc. was selected as the vendor to replace the outdated operator-dependent Control Data Corp. C1000 communications-based system.

In September 1988, the shift to the CTX began. New capabilities are added as they are developed; most recently, for example, the CTX has provided fast-batch capability for advance ship notices.

Using the process, suppliers send electronic advance ship notices as the materials leave their shipping docks, and Chrysler verifies that the information is correct on-line. Then Chrysler notifies the assembly plant that the parts are on the way and that it should prepare to receive them.

"We get immediate notification that our ASN [advance ship notice] is either correct or incorrect," said George Compton at Coshocton, Ohio-based Pretty Products, Inc., which sells floor mats to Chrysler.

Death of DEC worker probed

BY MARYFRAN JOHNSON
CW STAFF

HUDSON, Mass. — The death last week of a Digital Equipment Corp. worker, who inhaled nitrogen gas while working at a semiconductor manufacturing plant, is the focus of an investigation by state and federal officials.

Mario J. Melo, a 24-year-old equipment cleaner, died Jan. 27 after breathing through a face mask attached to the Hudson Semiconductor Facility's central breathing air system, apparently while nitrogen gas was being pumped through the system to purge it of contaminants.

Investigating the incident are the federal Occupational Safety and Health Administration (OSHA), Hudson police and fire officials, the Middlesex County District Attorney's Office and DEC itself. The officials will interview employees, inspect the plant and review records pertaining to the safety system and employee training program.

DEC closed down the central breathing system for the duration of the investigation, a spokeswoman said.

Frank Gravitt, director of the Boston north area office of OSHA, said two prior inspections at DEC's Hudson plant in 1987 uncovered no violations. One centered on reports of elevated miscarriage rates among employees, while the other involved an oven accident in which five people were slightly injured.

Precedents may aid Lotus case

BY PATRICIA KEEFE
CW STAFF

BOSTON — Recent legal precedents may tip the scales of justice in favor of Lotus Development Corp., whose copyright infringement suit against Mosaic Software and Paperback International, Inc. opens tomorrow in Federal Circuit Court.

The 3-year-old suit, which also charges Paperback and Mosaic with false advertising and unfair trade practices, will probably draw close scrutiny from lawyers for Xerox Corp., Apple Computer, Inc. and Ashton-Tate Corp. All three companies have filed similar suits addressing intellectual property rights [see box].

"It is absolutely of interest [because] it will have bearing on our case," said Stanley Witkow, a vice-president and general counsel for Ashton-Tate.

The Lotus case is not the first "look-and-feel" suit to come to trial, but it does involve some of the better known players in the micro software arena. Industry observers typically cite three judgments for the plaintiff issued during the last three years in suits centered on copying of screen interfaces.

Paperback Software Founder Adam Osbourne argued that legal precedent actually favors his case, although he did not cite any examples. "Our case is virtually watertight," he said.

According to attorney Lee T. Gesmer, a partner at Lucash, Gesmer & Updegrove and a specialist in high-tech copyright, Lotus has to prove the following to win its case: that 1-2-3 exceeds minimal standards of originality, that the defendants had prior access to 1-2-3 and that substantial similarity exists. In his opinion, that will not be hard.

The Lotus suit charges that Mosaic's The Twin and Paperback's VP Planner spreadsheets "deliberately recreate, with only trivial variations, the user interface of Lotus 1-2-3 [Versions 1.0A and 2.01]," including its macros, menus and menu organization "in toto, keystroke by keystroke," said Lotus general counsel Thomas Lemberg.

Lotus is not trying to copyright concepts, just the way in which they are carried out, he claimed. "It's okay if they do the same thing but not in the same way," Lemberg said. Otherwise, "It's a tremendous rip-off," he said.

Paperback and Mosaic contend just the opposite — that Lotus is trying to monopolize basic terms and functions. Moreover, critics of these suits claim it is okay for products to look alike as long as the code is different. Osbourne said that command sequences and instruction sets have always been copied.

Both defendants also claim 1-2-3 is "almost identical" to Visicalc, which Lotus purchased patent rights to in 1985 after winning a suit filed by Visicalc's developer.

A stronger, and so far untried, defense strategy, according to Gesmer, harks back to court rulings that software languages are not copyrightable. Part of Paperback's defense lies in proving that 1-2-3's macro facilities and command set have evolved into a language used by users and developers to create 1-2-3 programs.

"Paperback is saying that by trying to protect that organization and sequence of commands, you are protecting what has become a language," Gesmer said. "It's definitely an issue."

Cases of note

Other pending lawsuits of note alleging copyright violations include:

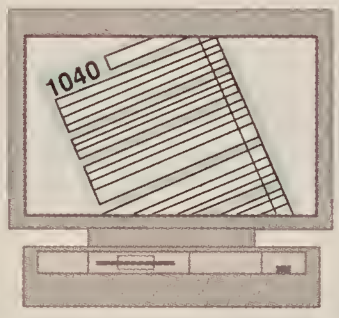
- *Apple Computer, Inc.* v. *Microsoft Corp. and Hewlett-Packard Co.* — Filed March 17, 1988, the Apple suit alleges illegal use of its Macintosh user interface and charges Microsoft with exceeding "limited license rights."
- *Ashton-Tate Corp.* v. *Fox Software, Inc. and The Santa Cruz Operation, Inc.* — Filed Nov. 18, 1988, Ashton-Tate's suit contends that Foxbase+ "deliberately mimicked and copied" copyrighted elements in AT's Dbase family. SCO markets a Xenix version of Foxbase+.
- *Xerox Corp.* v. *Apple* — Filed Dec. 14, 1989, the Xerox suit charges Apple with unlawful use of Xerox's interface software and copyright misrepresentation.

IRS urges taxpayers to file electronically

BY PETER BARTOLIK
CW STAFF

That W-2 form you received in the last couple of weeks could generate cold cash much quicker than in past years.

With electronic-filing capabilities now available in all 50 states, the Internal Revenue Service last week said individual taxpayers should consider the alternative of using computers and telecommunications services to obtain a quick refund. Refunds would be made within an average of two weeks if taxpayers elect a direct-deposit payment option, or three weeks for a check, compared with six weeks for returns filed on paper.



Electronically filed returns cost just one-tenth of what it costs to process paper returns and eliminate both a burdensome paper storage system and significant data entry error rate. IRS spokesman Frank Keith said more than 800,000 returns can be stored on one side of a 12-in. optical disc; a written signature must still be forwarded to the IRS.

Last year, the IRS processed returns filed electronically for 1.2 million tax payers in 36 states. This year, it expects 2 million to file in this manner.

H & R Block, Inc., the ubiquitous storefront tax return service, accounted for 825,000 of those electronic returns last year, according to Harry Buckley, president and chief executive officer of the tax operations division. Although the company is testing out further automation of its operations, the more than 10 million returns that it processes annually will continue to be paper-based, with its employees using paper forms and submitting them to data entry personnel for transmission to the company's Compuserve, Inc. subsidiary for an additional $25 fee.

Some personal computer software firms, however, are marketing electronic transmission options. Several have set up arrangements with IRS-approved agents to accept individual tax return files on disk through the mail and electronically transmit them to one of three IRS service centers.

Chipsoft, Inc., publisher of Turbotax Personal for individual users and Turbotax Pro series for professional preparers, last week announced it has gone one step further and arranged for users of its package to transmit via modem to Nelco, Inc. in Green Bay, Wis., which will transmit to the IRS centers for an added cost of $26.50.

Joe Langler, vice-president of Nelco, said Nelco has been involved in electronic transmission for three years, since the IRS began initiating the service for professional preparers. The firm filed about 30,000 forms electronically last year and expects to transmit 250,000 this year, including an expected 5,000 to 10,000 from Turbotax users.

Kathy Lane, president of Softview, the producer of the Macintax and Taxview packages, said that in addition to individual PC users, the company's software is used by Instatax tax preparation service in San Diego and Norwest Corp.'s financial services division in Minneapolis, which transmit electronically.

Electronic returns could spark a cottage industry of technically equipped preparers, Lane said. "Anyone can do electronic filing if they go through the IRS process" and meet technical requirements, she said. The IRS has received 20,000 applications this year — up from 9,000 last year — for transmission authorization by service bureaus, accountants, bank trust departments and other preparers.

If you're one of those that owes Uncle Sam, you're not affected yet. However, according to Keith, electronic collection of taxes due is a priority enhancement under consideration.

VAX

FROM PAGE 1

memory and 400M bytes of disk storage, Shannon said. "The system will run standard, unmodified VMS applications," he added. "A key component of this announcement will be VMS 5.4."

The new operating system is the only one that will run on the VAX 9000 mainframe, due to begin shipping this spring. Both the mainframe and the new fault-tolerant box — which analysts said would likely run a specialized version of VMS 5.4 — are managed by DEC's high-end systems group in Marlboro, Mass.

On-line transaction processing (OLTP) is the major target for Cirrus, with particular emphasis on applications in banking, electronic funds transfer, manufacturing and telecommunications, DEC officials confirmed.

"For critical applications, a customer wants the highest level of data integrity possible, and DEC is saying that our product strategy will now allow that," said Fernando Colon Osorio, the corporate consulting engineer managing DEC's fault-tolerant project.

Colon Osorio declined to discuss specifics about the new machine, but he did acknowledge that it will be able to "detect, isolate, reconfigure and continue an operation" the way fault-tolerant machines from Tandem Computers, Inc. and Stratus Computer, Inc. do. "There is no single point of failure," he said.

Set to grow

The fault-tolerant market niche alone accounts for $2 billion in revenue now, and analysts predict fivefold growth during the coming decade. The overall OLTP market is estimated at up to $30 billion.

With an installed base of 15,000 Vaxcluster systems representing 80,000 individual nodes, DEC is in a strong position to "survive very well in the fault-tolerant market with the accounts they've already got," said James Hammons, an analyst at Sierra Group, Inc. in Tempe, Ariz.

Similar to the approach taken by Stratus, DEC's Cirrus One will be primarily hardware-based fault tolerance — a sharp departure from its software-based approach to high availability in Vaxcluster systems.

Fault detection and recovery, the two major components of fault-tolerant systems, are handled differently by vendors in this field. Stratus bases its approach on hardware-based features built into its XA2000 system architecture, while Tandem relies more extensively on system software to detect and correct problems.

DEC is likely to incorporate some software-based checking and recovery features in its new machine as well, blurring the line between the hardware- and software-based approaches, according to sources familiar with the Cirrus.

An availability date for a fault-tolerant implementation of Ultrix, the DEC version of Unix, will be announced within six months, Hammons said.

Several analysts and users also said they expect the announcement to provide some clues to when DEC will bring out a VMS integrated with Posix, the U.S. government-sponsored interface standard. A Posix-compliant VMS would allow any applications written to that interface to run on a VAX.

Local/remote net link debuts

BY JOANIE M. WEXLER
CW STAFF

BOSTON — Racal-Milgo last week spawned a new breed of internetworking products it claims will save network managers from having to patch their local-area networks together with current-generation devices that force users into difficult trade-offs.

Lannet Express — which operates at a hasty 32 million instructions per second — is targeted at network managers charged with linking three or more LANs at three or more locations, according to Joe Rosenthal, Racal-Milgo's vice-president of marketing and strategic planning.

Racal's product reportedly combines the advantages of bridges and routers while eliminating their disadvantages. It also supports both local and remote internetworking in one device — a feature currently unavailable in a single internetworking product.

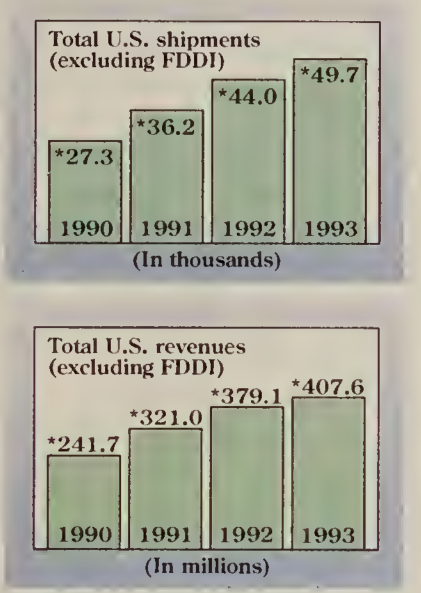
Traditional bridges come in two basic flavors: local bridges, which connect LANs in fairly close geographic proximity, and remote bridges, which link LANs over longer distance communications channels.

While bridges offer high throughput and relatively low cost, the broadcast technique can clutter up the transmission medium with unnecessary traffic and also create an environment susceptible to eavesdroppers.

Higher priced routers, which only route specific protocols, are better suited for security-dependent networks, but they sacrifice some performance for the added functionality.

Tapping in

Steady growth in the bridge/router market reflects the shift from intra- to inter-LAN networking



* Projected

SOURCE: INTERNATIONAL DATA CORP. CW CHART: MARIE HAINES

Certain hybrid products, known as brouters, bridge certain protocols and route others within one device, retaining both the attributes and limitations of the individual products.

Racal-Milgo claims its best-of-all-worlds approach may eventually eliminate the need for multiple bridging and routing products — resulting in lower equipment costs and one-stop shopping.

"Lannet Express aims to deliver two main functions network managers desperately need: to easily build complex network topologies and maintain centralized administrative control over the enterprise network," noted Tim Zerbiec, principal and vice-president of technology at Vertical Systems Group.

Centralized network management is provided via an IBM Personal System/2 or Compaq Computer Corp. Deskpro personal computer coupled with Racal-Milgo's Communications Management Series network management system, which uses a Microsoft Corp. Windows-compatible graphical user interface.

The first Lannet Express interface, slated to ship during the second quarter of this year, is compatible with Ethernet/802.3 protocols. The price for a unit with two LAN ports and two wide-area network ports is reportedly under $20,000.

A Token-Ring interface is scheduled to roll out next, followed by Internet Protocol routing, Simple Network Management Protocol and Fiber Distributed Data Interface connections.

Microsoft pushing to close OS/2, DOS gap

BY CHARLES VON SIMSON
CW STAFF

REDMOND, Wash. — Senior Microsoft Corp. executives last week laid out new details of the company's plans to tighten the integration of applications running under Windows and Presentation Manager.

Microsoft is pushing 1990 as the year that many users will leave DOS for OS/2. To spur the migration, the company is driving as hard as possible to tightly integrate the two operating systems. The goal is to allow end users to cut and paste data between the two environments.

Enhanced development tools adapted from Micrografx, Inc. technology will aid the integration and migration process between the two systems, ultimately accelerating the development of applications for OS/2, Microsoft officials said.

"In terms of allowing users to migrate as painlessly as possible, that kind of movement of data is important," said Peter Neupert, Microsoft senior general manager for OS/2.

Neupert's remarks came last week as the company shared its plans for the development of OS/2 Version 2.0, the 32-bit flavor of the operating system, with third-party developers.

The most significant feature of last week's announcement was that the next generation of the OS/2 2.0 developers tool kit, scheduled for availability this spring, will contain a library of application programming interfaces (API) that will help automate development of standard links between Windows and Presentation Manager.

The new tool-kit technology is aimed at neutralizing some of the problems that have plagued OS/2 since its introduction. While the Windows and Presentation Manager interfaces are designed to look identical, the APIs of the DOS and OS/2 operating systems underlying them are fundamentally different.

Enter Micrografx, a Richardson, Texas, software developer that has built a reputation on its Mirrors development tool kit for porting applications from DOS to OS/2. Microsoft and Micrografx recently announced an exchange agreement allowing Microsoft to use portions of Micrografx's Mirrors tool kit in exchange for undisclosed Microsoft technology.

"We did not take delivery of code from Micrografx," Neupert said. "But our implementation of their ideas has been important to this project."

In addition, Neupert said that Microsoft hopes the new version of the OS/2 developers tool kit will lure some Unix developers who had shunned OS/2 onto the platform and spur the introduction of new applications.

"A lot of Unix [independent software vendors] have said that they did not want to support a 16-bit version of OS/2," he said. "But they have expressed interest in working on a 32-bit memory model that does not require them to re-architect systems."

Feds ease supercomputer export grip

BY MITCH BETTS
and ELLIS BOOKER
CW STAFF

WASHINGTON, D.C. — The U.S. Department of Commerce is preparing to relax — but just a little — export controls on supercomputers.

The department last week released a proposal that would require only "minimal security safeguards" for supercomputers performing in the range of 150 million to 300 million floating-point operations per second (MFLOPS), when sold to any of 23 approved countries. Supercomputers performing above 300 MFLOPS would get a much more rigorous export review.

"The new threshold falls far short of what industry had hoped," because very few supercomputers fall below the 300 MFLOPS line, said William Chastka, vice-president of Washington Resources International, an export consulting firm in Washington, D.C.

The American Electronics Association previously urged the department to raise the threshold for stringent controls to 600 MFLOPS, up from the current line of 150 or 200 MFLOPS.

For years, the Commerce Department has been struggling to come up with a definition of a supercomputer, since supercomputer exports require special authorization. Last week's proposal said it is a computer capable of 100 MFLOPS or more, but Chastka said the industry would prefer a definition closer to 200 or 300 MFLOPS.

The Commerce Department established its own formula and three technical guidelines for calculating the MFLOPS performance of individual processors but will rely on vendors for the data used in the formula.

A spokesman for supercomputer market leader Cray Research, Inc. in Minneapolis said the company's systems already are above the 300 MFLOPS limit. He said only the Cray X-MP in a single-processor configuration and the company's first supercomputer, the now-discontinued Cray-1, would fall under the 300 MFLOPS limit. "They would be sold as used systems," he said, adding that Cray has basically ceased shipping the Cray-1.

However, the spokesman added that Cray had not been denied any sales to allied nations because of the old export restrictions and that the company had made sales to three nonallied nations — India, South Korea and Taiwan — under the old rules.

Although not expecting any major impact, vendors did welcome relaxation of regulations.

"The practical impact is that it reduces the time it takes for an export license to be granted," said Frank Vince, vice-president of marketing at Convex Computer Corp. in Richardson, Texas. Among what he called the "onerous" aspects of the old rule were mandated on-site inspections and the need to obtain government-to-government assurances in advance of some foreign sales.

U.S. systems vendors, which are competing with foreign vendors for sales in Europe and Asia, are frustrated by delays of three to four months in getting supercomputer export licenses under current rules, Chastka said.

The department did carve out two exceptions to the supercomputer definition: minisupercomputers and workstations that might otherwise be caught in the 100 MFLOPS definition.

The relaxed controls would apply to sales to 23 U.S. allies or neutral countries, including members of the Paris-based Coordinating Committee on Multilateral Export Controls.

In a prepared statement, the Commerce Department added that it will not relax its ban on supercomputer sales to Warsaw Pact countries. Export controls are aimed at preventing the Soviet Bloc from obtaining high-tech equipment that could be used for military purposes.

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TRENDS

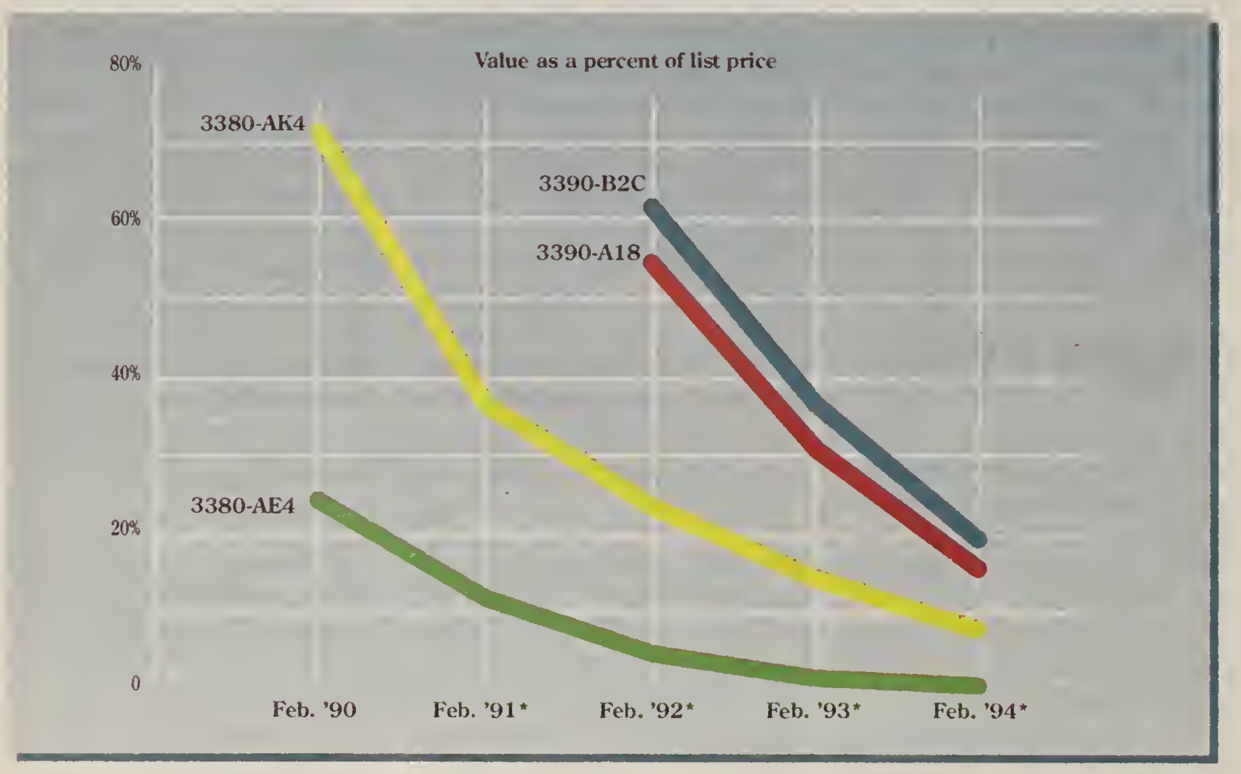
IBM 3380 IBM 3390

Computer Economics' residual values forecast the fair market value of selected IBM disk drives

Model	List price in thousands	Residual value in thousands				
		Feb. '90	Feb. '91*	Feb. '92*	Feb. '93*	Feb. '94*
3380-AE4	$118.7	$28.0	$13.1	$5.0	$1.1	—
3380-AK4	$134.4	$95.0	$48.4	$31.0	$18.4	$9.5
3390-A18	$169.0	—	—	$90.8	$50.7	$25.2
3390-B1C	$215.0	—	—	$118.0	$68.2	$35.3
3390-A28	$209.0	—	—	$127.1	$73.2	$37.4
3390-B2C	$275.0	—	—	$167.5	$99.8	$52.0
3390-2	$115.5	—	$78.1	$59.0	$41.9	$27.6
3390-J3	$302.8	—	$241.3	$183.2	$129.9	$86.0

With their faster access times, higher data transfer rates and relatively low cost per megabyte, IBM's new 3390 disk drive series poses a serious threat to the value of the older 3380 drives.

However, compatibility problems such as longer track lengths and the fact that the 3390s only connect 3990-2 or 3990-3 disk controllers will make the task of migrating expensive for smaller data centers. Thus leaving a market and residual life for 3380s looks good for some time to come.



SOURCE: COMPUTER ECONOMICS, INC. CARLSBAD, CALIF.
CW CHART: TOM MONAHAN

*Projected

NEXT WEEK

Partnering between IS and business managers is becoming more commonplace. At Air Products & Chemicals, Inc. MIS manager **Paul Prutzman** (left) is even joining in on sales calls to prospective customers with business manager **George Diehl.** Executive Report examines this phenomenon and provides guidelines for partnering without tears.

Andy Freeberg

If you're like most information systems organizations, you dump anywhere from 30% to 80% of your time and money on maintaining software code. Fortunately, new research offers great hope for slashing maintenance costs. In Depth offers some practical tips on how to shave costs by improving maintenance documentation.

INSIDE LINES

Thank you for your support

Paperback Software, currently embroiled in a lawsuit filed by Lotus (see story page 144), has yet another suit on the back burner. "Insurance companies don't like to honor their policies if it costs them money," said company President Adam Osbourne, relating that the insurer sued Paperback to prevent having to pay for the Lotus litigation, "claiming that we knew what we did was illegal, but we did it anyway." That suit has been put into "abeyance" until the Lotus suit is decided.

All souped up and raring to go

IBM is gearing up to pull a few servers out of its hat, possibly by the third week of February. The 16-bit Personal System/2 Model 80 tower — said to be slower than the Model 70 — will be replaced with a 33-MHz, 80386-based tower.

What comes Next?

IBM today will announce the role that Nextstep, Next Computer's development language and interface, will play in the anticipated announcement of IBM's workstation. An IBM spokesman said no product will be announced, but the role of Nextstep and IBM's AIX-based workstation will be discussed.

Play it again . . .

Oracle is adding another category of applications to the growing stable of software that leverages its base product, the Oracle relational database management system. The new human resources package, called Oracle Personnel, is compatible with the Oracle Financials applications. It will be announced this week for DEC's VAX and the HP 3000 and 9000 series as well as DG, Sequent, Pyramid and Sun systems.

In Bankers We Trust — DEC

Bankers Trust — the ultimate DEC shop — will unveil a new trading system this week that will be brought on-line at its London operations. Although the announcement will be made at DEC's new New York-based transaction processing resource center, the system is decidedly decision support-oriented. The systems of DEC workstations and software will support more than 200 traders in analyzing and disseminating data on the trading floor.

Valley girls need not apply

Hewlett-Packard indicated there would be no more expansion near the company's headquarters in the San Francisco Bay Area. HP's plants in suburban areas, such as Roseville, Calif., and Corvallis, Ore., are growing, primarily because of the labor force. "You get people here who work harder for the money and don't jump to the company across the street when they get offered 10 cents more," said a Corvallis plant spokesman.

Who needs whom the most?

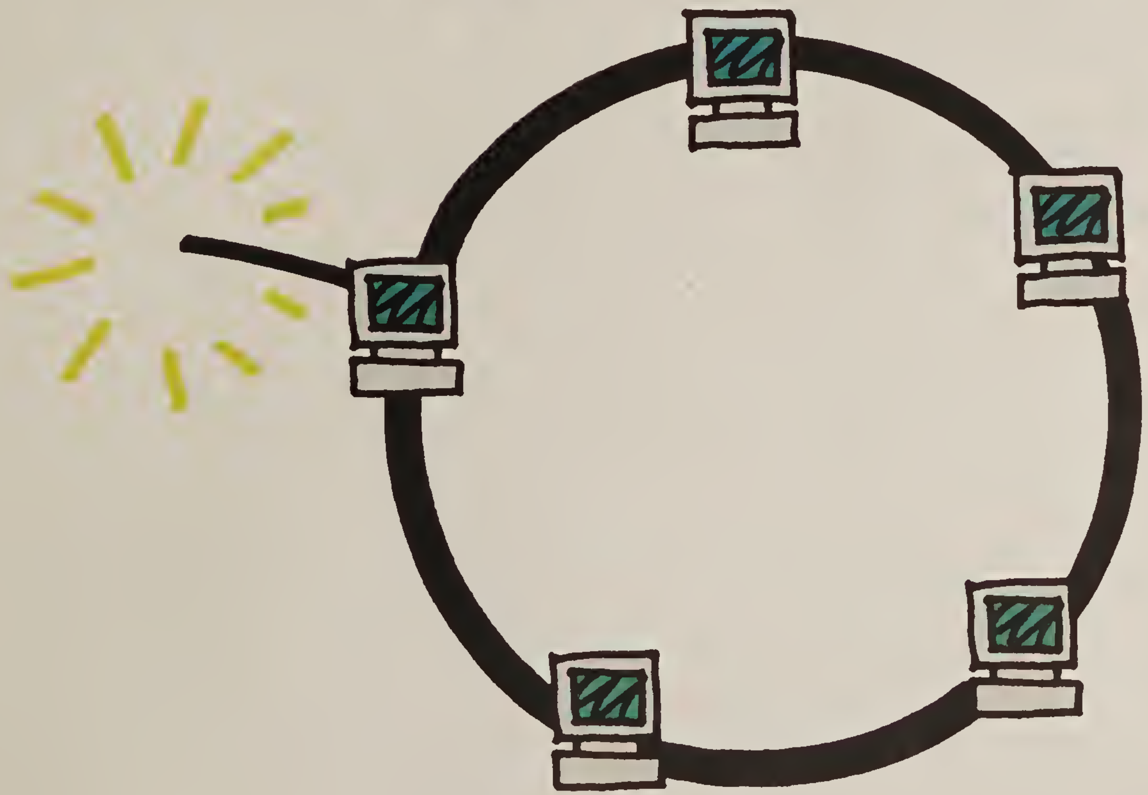
The Macintosh turns up in the darnedest places. One of the newest Mac users, according to Apple chief John Sculley, is Soviet President Mikhail Gorbachev. And despite the USSR's rubles woes, we don't think he uses the low-price Mac users are clamoring for. Next on Apple's agenda is the Macintosh IIXI, which is scheduled for release next month and is expected to compete with Sun workstations in both price and performance. The Motorola 68040 chip is expected to be used.

Is there morality among machines?

The Association of Computing Machinery and the IEEE plan to introduce guidelines this summer for college undergraduate computer science programs. The group will suggest that classroom instruction include ethics and legal issues, such as the liability associated with writing faulty code, according to Purdue University Prof. Eugene Spafford.

Speaking of computer ethics, Computerworld *has received several telephone calls from readers suggesting suitable punishment for Robert T. Morris, who awaits sentencing after being found guilty of unleashing the Internet worm. Most believe Morris should be made to do community service. Your views on this and other worldly matters can get to us via MCI-Mail (address: COMPUTERWORLD), fax (508-875-8931) or phone (800-343-6474).*

The Wrong Token Ring Network Can Have A Big Impact On Your Business.



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Conference Schedule

Atlanta	4/26	Cleveland	5/8	Houston	3/20	New York	4/19	Toronto	5/15
Boston	4/5	Dallas	3/27	Los Angeles	4/24	Philadelphia	4/3	Washington, DC	5/16
Chicago	3/29, 5/2	Detroit	5/3	Minneapolis	5/1	San Francisco	4/17		

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